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ABSTRACT

This report of a 3-year project discusses the results of the testing of computer conferencing and e-mail (electronic mail) at Montgomery College (Maryland) over a period of four semesters. The product was designed to answer the following questions: (1) Could computer conferencing or e-mail increase access? (2) Would the quality of the instruction via e-mail be lower than the quality of traditional instruction? (3) Do certain disciplines lend themselves more to e-mail instruction than others? (4) What should be the extent of the commitment of faculty and the administration? and (5) Is e-mail cost effective? To investigate these questions, e-mail was used to teach courses entirely via interactive computer and to supplement video courses for more than 100 distance learners. Outcomes were compared with identical traditional classes taught by the same instructors. Results included more interaction between student and faculty, improvement of quality of writing abilities, learning outcomes comparable to traditional classes, and easier access to learning opportunities. The project uncovered major problems in the areas of technical support, training, and marketing. Evaluations, promotional and publicity materials, external dissemination, and comments are appended. Also appended is a summary report from a 1988 conference on technology in higher education and a discussion paper and two case studies from the conference. (TMK)

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COMPUTER CONFERENCING PROJECT

FINAL REPORT

Submitted to:

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October 28, 1991

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FINAL REPORT

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SUMMARIES

Brief Summary

Computer conferencing and E-Mail were tested at Montgomery College over a period of four semesters. E-Mail was used to teach courses entirely via the interactive computer and to supplement video courses for more than 100 distant learners. Outcomes were compared with identical traditional classes taught by the same instructors. Results included more interaction between students and faculty, improvement of quality of writing abilities, learning outcomes comparable to traditional classes, and easier access to learning opportunities. The project uncovered major problems in areas of technical support, training, and marketing.

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Computer Conferencing Project 1988-1991 - Final Report

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Testing Computer Conferencing Formats: 1988-1991

Executive Summary

A. Project Overview

The computer conferencing or E-Mail instruction consisted at first of professors teaching the same courses during the same semester in two different modes -- the traditional lecture method and the interactive computer method.

Later the system was modified so that in addition to courses taught entirely via interactive computer, E-Mail was used to supplement video courses by providing a high degree of interaction between and among students and faculty involved in distance learning.

The project confirmed some of the strategies and assumptions about E-Mail -- greater interaction, easier access, improved writing, and learning outcomes comparable to traditional class instruction. It also identified and defined some major problems confronting institutions which intend to utilize this new medium. Better technical support, more extensive training, more targeted marketing, and a long-term commitment from the institution were among the major questions. Cost effectiveness results were inconclusive, although if student numbers using this new system were to grow, institutions would be able to reevaluate their long term building programs.

The project at Montgomery College was subsidized by the College and the interactive computer method of instruction is now incorporated into its curriculum, including a role in the Accelerated Degree Program offered by the College.

B. Purpose

The project was designed to answer a number of questions. Could computer conferencing or E-Mail increase access? Would the quality of the instruction via E-Mail be lower than the quality of traditional instruction? Do certain disciplines lend themselves more to E-Mail instruction than others? What should be the extent of the commitment of faculty and the administration? Is E-Mail cost effective?

C. Background and Origins

Dr. Donald R. McNeil of the Academy for Educational Development and Dr. Tim Peterson, Dean of Extended Learning at Montgomery College, teamed to design the program to test the interactive computer as an instructional tool. The College was interested in expanding access, testing academic outcomes, and measuring the cost effectiveness of E-Mail.

D. Project Descriptions

During the first year, two courses were taught entirely by E-Mail. The second and third years E-Mail was used as a supplement to video courses.

The Asynchronous system enabled students and faculty to work at their own time and in their own space, thus attracting a number of students who would not or could not come to campus.

Instructors taught the E-Mail and the E-Mail supplemented video courses during the same semesters they taught the courses in the traditional mode.

E. Project Results

E-Mail promoted greater interactions between faculty and students, improved the quality of student writing, increased access, and reached older, more mature, and motivated students. Student learning levels equaled that of students in the traditionally taught classes.

Cost effectiveness proved difficult to measure and was anecdotal at best. However, if use of the E-Mail system grows, there could be sizable savings in buildings and classroom instruction costs.

E-Mail seemed to be effective in a variety of types of courses, but especially in those where interactive discussions were a vital part of the learning process.

F. Summary and Conclusions

The planning process should have entailed more consultation with faculty deans, the computer center and middle management administration.

The leadership in the faculty varied. Some enthusiastically embraced the idea of E-Mail; others thought it was a nuisance. On the whole, when faculty got involved and learned the process, the reactions were extremely favorable.

The need for technical support was the most critical element in the success of the project. After we stabilized this support, the project ran smoothly.

The need for extensive and intensive training of faculty both in the uses of the computer and the pedagogy required was demonstrated throughout the project.

Targeted marketing, rather than general purpose marketing was the most effective way of reaching the older, more mature audiences we sought.

There are up front costs of instituting the E-Mail system (hardware, software, and staff). Institutions should look at those as investments for the future as the results will be realized over a period of years as the method becomes increasingly in demand.

Montgomery College invested heavily in the project in addition to the FIPSE provided funds, and the institution is continuing its commitment by incorporating E-Mail into its regular academic program, both as a supplement to video courses and as a stand-alone instructional method.

This commitment has to be long-term if the program is to be effective. E-Mail needs time to grow and develop and find leadership and faculty members who wish to experiment with innovative teaching.

G. Appendices

Appendix I - Evaluations
Appendix II - Promotion Materials and Publicity
Appendix III - External Dissemination
Appendix IV - Comments

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FINAL REPORT

Testing Computer Conferencing Formats
1988-91

The Academy for Educational Development
Washington, D.C.
October 1991

Introduction

During the course of this experimental project, great changes occurred in the relationship between institutions of higher education and technology. Distance learning became ever more popular; many colleges adapted some form of computer interaction for instruction; and there was tremendous growth in the number of E-Mail or interactive systems either coming on the market or being designed locally. Moreover, many of the commercial systems were simplified and it was possible for faculty and technical staff to modify them to fit local demands. And lastly, the idea of multimedia, or using a combination of technologies began to emerge as a dominating factor as institutions experimented with them.

This project, operating through Montgomery College in Maryland, reflects these changes. Distance learning courses increased. The idea of computer interaction was embraced by members of the administration, staff and faculty. When the original computer conferencing system broke down, an E-Mail system was found immediately and professional personnel adapted the system to the needs of the project. And lastly, in the second year, we added video courses with an E-Mail supplement, and telephone support, thereby combining a number of technologies.

Appendix I contains the written evaluations of the two outside evaluators, the campus coordinator, the head of the technical support system and the Dean responsible for the programs on the Montgomery College campuses. These should be read carefully in conjunction with this final report.

A. Project Overview

The project was designed to test the instructional and cost effectiveness of computer conferencing (or E-Mail as it came to be called). It was aimed at increasing access and improving the quality of instruction.

The Academy for Educational Development joined with Montgomery College to design a program whereby the same professors would teach the same courses during the same semesters in two different modes -- by the traditional lecture mode with a regular class and by computer conferencing for a class made up of those who would interact with the professor entirely by computer.

The original design called for a semester of planning and training, four semesters of teaching, and a semester for evaluation and completion of the report. Originally, we were to teach two courses per semester. When we modified the system by including support for TV-based courses, we taught as many as 9 courses per semester. The two instructors who taught the first semester repeated their courses the second semester. In the last two semesters, when TV courses were supplemented by E-Mail, eight more faculty members participated.

Most of the students were mature adults, and overall effectiveness was on a par with the traditional instructional program. There was some indication that some students saved money by using the technology-based courses, and the institution found that while there were relatively heavy start-up costs, these expenses could be viewed as an investment with the return realized over a period of years, especially if more and more students used these distance learning technologies there could be sizable savings in buildings and maintenance.

Furthermore, as the project developed, more and more students had their own computer equipment, including modems. If that trend continues, the rate of increase of equipment purchase to student enrolment will level off or decline.

The program was incorporated into the College's ongoing activities and remains a vital part of its Associate Degree program for distance learners.

Most importantly, the FIPSE-supported project enabled us to define some very real problems connected with instituting instruction by E-Mail. Generally, these revolved around the need for technical support, training (both students and faculty), and marketing.

The FIPSE-sponsored computer conferencing program demonstrated two things: First, it exposed some of the basic problems of introducing and maintaining the computer as an interactive instruction tool; and second, it confirmed the long-range potentialities of interactive computer instruction.

B. Purpose

In 1988, three of the major questions facing higher education were:

1. How to improve access to credit instruction?
2. How to use technology to reach students who did not want to or could not come to campus at specified times?
3. Are alternative methods of instruction cost effective?

A number of institutions were beginning to offer classes by television or lecture courses off campus. But few of them were heavily involved with interactive computer instruction and the issue of cost effectiveness was not yet a major consideration as institutions began looking to technology to help them solve some of these problems.

Montgomery College, a multi-campus community college of 24,000 students near the metropolitan Washington, D.C. area seemed a likely place to test the concepts of access, improved quality, and proper use of technology. Situated in an affluent setting with a multitude of corporations, including high tech operations, Montgomery College already served thousands of older students and it had been offering telecourses for 12 years.

Still, the problem of access to the college remained. Working adults often could not meet at the times classes met; women with children found it difficult to stay on a rigid class schedule. Disabled persons found it especially difficult to make the necessary trips to the campus for the classes. Often classes were filled and unavailable. People handicapped by time and distance often were shut out from the opportunities which a college education could bring.

Besides, there were many questions in the minds of faculty members and administrators about the quality of alternative teaching methods such as television, radio and computer conferencing.

There obviously were questions to be answered before there could be widespread acceptance of the concept. Would the outcomes be higher or lower than those in traditional classes? Will faculty get involved? Can the program be integrated into a variety of subject matter disciplines? Is E-Mail more effective in distance learning or could it be used to supplement lecture or video courses? How can faculty resistance be overcome? How much more or less time will a faculty member devote to an E-Mail course and what shall be the reward system for those who innovate? Which institutional officers and staff need to be involved? Under what arrangements are capital and operating costs most cost effective?

At the outset, our estimate of the questions to be answered and the nature of the problems we faced in implementing the project were grossly inadequate and under stated. At the end of the project we paid much more attention to technical support that is easily available and always at hand. It was not until we hired our own person for the project and were not dependent on the computer center, that our technical problems and the frustrations of students and faculty subsided.

We learned that technical problems could be minimized by adopting standard software packages (word processing, communications, etc.). We also learned that technical support (as well as training) had to be much more simplified than we originally planned.

Administratively, a number of people should be involved in the planning and development stages when inaugurating an E-Mail system. These include the computer center and counseling staffs, the finance office, the deans and department chairs in those subject areas where courses are to be taught, and a number of faculty members -- which should include some of the more respected and credible professors who provide good role models for innovative programs such as this. Not all of the various components have to be represented on every issue but careful groundwork with each of these groups will enhance the possibilities of success.

We realize now how important it is to have thorough training programs of both faculty and students. They should be intensive and of sufficient length to guarantee competency. Keyboard skills and understanding how a computer operates cannot be assumed, and simplification of the training is most important. Training of faculty in the pedagogy associated with E-Mail instruction is important, too. Faculty members who give large parts of their lectures on screen are not effective. The pedagogy of E-Mail instruction calls for a give and take method of a seminar, with both the instructor and the students exchanging brief pertinent questions and responses. The pedagogy is different than in traditional classes. Some limit should be placed on the length of questions and responses (perhaps no more than two screens at one time).

We now place greater emphasis on students and faculty either having some prior computer skills or be willing to work intensively to acquire them before taking the courses. As one of the staff observed, it is difficult for a student without any experience to learn how to use the PC, learn about DOS and the word processing package, learn the telecommunications system and how to use a modem, how to access and then navigate around in the E-Mail system, learn how to upload and download documents, and still concentrate on learning the subject matter of the course.

We have learned a great deal about selective marketing. Originally we thought the demographics of the area and the College's past record would be sufficient to attract students to this innovative way of learning. Not so. There were several deterrents. We depended on regular mailings to carry our message and E-Mail was not highlighted sufficiently to attract attention to the innovative program. In addition, computers scare some people and added to that, even for those who knew computers, 90% of those who DID take courses, had never used a modem and communications software. Furthermore, many of the people with computer skills already had a college degree and did not need the types of courses we were offering. Lastly, we found that E-Mail instruction, like many specialized products, had to be marketed selectively, that we should aim at those who could benefit from the experience. Our marketing attempts then turned to such groups as the disabled, parents without partners, and computer enthusiasts who had not been to college.

The problem of cost effectiveness is still with us, partly because there have not been sufficient numbers of students in these types of E-Mail or E-mail-supported courses to project any long range major savings such as developing new campuses or erecting new buildings.

Initial start-up costs include computers, software, and modems. Ongoing costs include technical support and training expenses.

One has to look at these expenses partly in light of the development of institutions of higher education and society in general. When computers -- especially the Personal Computer -- came on the market, there were few people who asked about the start-up costs to buy computers and the software to run them. Instead, institutions knew they had to have them and somehow in those early years, either rearranged their budgets or received new moneys to purchase the equipment that would move them into the modern age. By and large, there were no diversions of moneys from existing programs; the computers were added and few programs were cut as a result.

So it may be with computers as an instructional tool. If the system works as well as it did in Montgomery County with more professors becoming involved, more courses being taught and the level of acceptance by students greater, the institutions will find the resources necessary to augment the traditional teaching systems. Institutions have to be careful about claiming any kind of cost savings, especially in the early years, because of the start-up costs for hardware, software, technical support and training.

Besides cost effectiveness to the institution we found some indication that "cost avoidance" was a factor in bringing students into the E-Mail and video courses. Certain groups avoided paying baby sitter, mileage, parking and food charges by taking the courses in their homes or offices.

C. Background and Origins

In 1988, the Director of the project, Dr. Donald R. McNeil, Senior Program Officer of the Academy for Educational Development, teamed with Tim Peterson, the Dean of Extended Learning Services at Montgomery College, to design a program that would test the effectiveness of the computer as an interactive instructional tool and to measure the cost effectiveness of this new method of teacher-student interaction.

The Director had used computer conferencing as an instructional tool when he was Provost of the American Open University, the distance learning arm of New York Institute of Technology. The Academy for Educational Development had a long record of working in the field of technology. It staffed the Commission on Instructional Technology and prepared the report to the President of the United States, To Improve Learning and printed by the House Committee on Education and Labor in 1970.

Dr. Tim Peterson, Dean of Extended Learning at Montgomery College, was interested in improving access and quality through various uses of technologies. He already had a record of expanding the video course credit program and other off-campus offerings for adults desiring credit courses. The next step was computer interaction.

The administration of the College was favorably disposed to the idea. Several faculty members were knowledgeable in the field but because of heavy teaching loads, several of those we sought to participate in the program, could not.

The computer center, burdened with work already, was not exactly in a position to favor taking on this new measure of support. It did not have the expertise to handle the chosen software and often could not find the time to provide the necessary technical support needed by both faculty and students.

When the computer conferencing system proved inadequate because of hardware problems, we switched to an E-Mail system and had a faculty member customize it for our needs. He also provided the technical backup which we had so underestimated the need of. The project ran more smoothly after that.

D. Project Description

During the first year, faculty and staff were trained during the first semester and classes began the second. During that first year, the computer conferencing software was replaced by a different E-Mail system.

The second year, computer conferencing was also added as a supplement to a number of video courses already being offered by the College. Video courses often offer little opportunity for interaction, and computer conferencing was aimed at increasing interaction between and among students and faculty members.

The third and final year of the grant provided support for the first semester, and the second semester was devoted to the evaluation process. Montgomery College, however, continued teaching using the E-Mail system the second semester even though grant support for instruction had stopped.

The second semester of the first year when teaching via computer conferencing began, only four students were enrolled. By the final semester under the grant there were approximately 65 students in four courses using E-Mail. In the total program, more than 100 students and 14 faculty members participated in the 20 courses. A summary of courses tested during the three-years of the project follows.

COMPUTER CONFERENCING (E-MAIL) COURSES 1988-1991

Fall 1988 -- Preparation

Spring 1989 -- Computer Conferencing
HE100 Principles of Healthier Living
HS201 American History 1492-1865 offered (insufficient enrolment).

Fall 1989 -- Computer Conferencing
HE100 Principles of Healthier Living
HS201 American History 1492-1865

Spring 1990 -- Computer Conferencing
HS201 American History 1492-1865

-- Telecourses (12 offered of which 3 used e-mail)
BA101 Introduction to Business
MG101 Principles of Management
PY102 General Psychology

Fall 1990 -- Computer Conferencing
NO courses by e-mail only
HS201 American History 1492-1865 offered (insufficient enrolment).

-- Telecourses (11 offered of which 8 used e-mail)
BA101 Introduction to Business
EC201 Principles of Economics
EN101 Techniques of Reading & Writing
HS151 History of the Western Society & Culture
HS201 American History 1492-1865
MG101 Principles of Management
MG121 Introduction of Marketing
PY102 General Psychology

Spring 1991 -- Evaluation (Courses Continued through Montgomery
College without FIPSE funding).

-- Computer Conferencing
CS135 Introduction to Computer Applications
EN104 Technical Writing

-- Telecourses (11 offered of which 7 used e-mail)
BA101 Introduction to Business
EC201 Principles of Economics
HS161 History of the Western Society & Culture
HS202 American History 1865 - Present
MA216 Elements of Statistics
MG101 Principles of Management
PY102 General Psychology

There were three major assumptions underlying the testing of computer conferencing:

1) It would enable faculty and students to communicate frequently and effectively with each other wherever and whenever each person desired.
2) It would increase the quantity of interaction time between faculty members and students.
3) It would improve the quality of student thought, analysis and writing.

Because the system was asynchronous, students and faculty could work at their own time and in their own space. The convenience factor was an important part of the overall strategy. But the main concern was access for those who could not or would not attend a campus class.

We knew that students who took the course by E-Mail or video would be older students with life experiences and have strong personal and professional motivations to take advantage of this new method of instruction.

From the responses from the students who participated, the following demographic data were noted:

57% were female and 43% male
78% were white, 10% were black, and 12% were "other"
(meaning Asian, Hispanic, etc.)
Ages ranged from 19 to 84; the median age was 30, the mean 32, with a sizable number in their 60's and 70's.

We recruited faculty who were willing to try computer conferencing but we underestimated the time and effort needed to train them properly. There was less resistance from faculty and middle management administrators than we expected, but that probably was partly due to the fact that the project was relatively small and that a community college's mission is to reach out to the community and this program fit that category precisely.

We anticipated more support from the computer center than they were prepared to deliver. This problem relates to the matter of overall planning and bringing the players together early in the planning process.

Because Montgomery College was thoroughly committed to the program, College funds were made available to purchase modems to lend to the students taking the courses and lap top computers, modems and software were purchased for the faculty to be used by them as they developed and taught their courses. Montgomery College was planning an associate degree program using extended learning opportunities such as weekend and off campus courses and computer conferencing, along with the video courses, fit neatly into the concept. A summary of costs can be found in Appendix I in Tim Peterson's evaluation.

E. Project Results

The computer conferencing project was a learning experience not only for the students and the faculty, but to the administrators and leaders of this program. Some of the results reenforced some of the assumptions and strategies we started out with such as promoting greater interaction between faculty and students, improving the quality of student writing (through practice), increasing access, and reaching older, more mature and motivated students.

But the main result of these activities was uncovering some problems we had not anticipated and discovering the need for intensifying our efforts in certain areas. These included review and revision especially of our approaches to training, technical support and marketing.

Our evaluation procedures throughout the project were intended to answer the questions raised at the outset and to suggest modifications and changes in directions policies, and methods.

Evaluation methods took several forms. Questionnaires to students at the beginning of the course and again at the end of the course eliciting information as to cost effectiveness, satisfaction at course content, and comparison with other traditional courses they had taken.

Slightly different questionnaires but with content similar to the ones given computer conferencing students were offered to students in the traditional class which the professor was also teaching.

A questionnaire also was sent to the computer center personnel.

A second method of evaluation was to ask for written assessments from the campus coordinator, the support personnel and the director each year.

Finally, an outside evaluator was hired to help prepare the forms and conduct an independent evaluation. The first and second year's outside evaluation was a disappointment. We supplied the information and he gave us back textbook answers with little relevance to the questions for which we were seeking answers.

The third year we employed a different outside evaluator to conduct some in-depth interviews with students, faculty and staff. That report, along with written assessments by Dean Tim Peterson, our third year campus coordinator, Connie Cox, and our technical support person, Ben Acton, are in the appendices.

These reports should be read carefully for details pertaining to what is needed for institutions to launch such a program of interactive computer support of instruction. The overall results, from the perspective of the director, were as follows:

1. Student learning levels were as good as or better than traditional students taking the same courses from the same instructors. Grade levels were approximately the same. Almost all faculty members assessed outcomes favorably. One instructor noted that her E-Mail students assimilated the material better and thought more critically about the subject matter than the traditional students, who, she thought, seemed to retain more factual information.

2. Cost effectiveness depended on how it was measured. There are sizable up front costs (hardware, software, staff, and supplies), but measured against the needs of the modern institution to be computer literate and the long range costs of adding classrooms or buildings, the cost effectiveness will depend on the number of faculty and students who begin to get involved in this networking mode of operation.

3. Asynchronous and interactive computer applications are effective in courses taught entirely in this mode, but also they are supportive of distance learning programs conducted via video because they improve the interaction between and among students and faculty. They also could be used for audio-based courses.

4. The question of which types of courses were best suited for the E-Mail and E-Mail supplement mode of teaching remains a question because so many factors are involved in the final decision of what is to be taught and which courses students will choose to be taught with an E-Mail ingredient. For example, social sciences and humanities courses had greater enrollments because those courses fit academic requirements for the associate degree. Some wanted courses that would improve job skills and took computer courses taught via E-Mail to learn programming. Most of the business courses (which had lower enrollments) were taken by majors in the field.

In addition, the leadership of the faculty varied. Those who were enthusiastic and learned the system, used E-Mail extensively. Others regarded it as an additional burden and hardly worth the effort. The devotees sometimes helped recruit others. Some of the sciences are difficult to teach in this mode because of lack of easy access to laboratories and graphic displays on the computer.

5. There are sizable numbers of potential students who can use computer interactive courses in a distance learning mode because they cannot or will not come to campus at the prescribed times.

6. The asynchronous nature of the offerings was a matter of tremendous convenience to some students who were working, tied to children at home, or in jobs that could not spare them to attend classes.

F. Summary and Conclusions

While these positive results of the computer conferencing project are encouraging, the major benefit may have been to identify logistic, policy, and implementation problems that institutions should be aware of.

1. The Planning Process. Not enough people were involved in the overall planning of the program prior to implementation. These included deans, staff of the computer center and faculty.

2. Technical Support. This was far and away the most important ingredient that we failed to foresee as we planned the program. In all the evaluations, this was the need most often expressed. When our first computer system crashed during the first year of the project and after we recruited someone specifically to provide technical support to students and faculty alike, we had very few crises. Sufficient support staff, with maximum availability and competence to solve problems by telephone (i.e. simplify the explanations), is critical to the success of the program. Additional phone lines were added the second and third years because of the increase in traffic. There were not enough students to make any conclusions as to what the ideal faculty-student ratio ought to be.

3. Training. This, too, cannot be underestimated in planning for implementation. We did not do enough intensive training in the beginning. In one class, while 80% said they used a computer in some way, only 17% said they had taken a course in computer science and only 10% had ever used a modem.

An important part of this training is the ability to offer simplified explanations aimed at lay persons, some of whom have little knowledge of the computer.

This training should include not only how to use the computer and its peripherals but pedagogical training of the faculty as well. Teaching via computer calls for almost a seminar approach, with a great deal of give and take between the instructors and the students.

Faculty members noted that they spent more time on these courses than on their traditional courses the first time they taught with interactive computers, but there was not that much difference later on. However, faculty must have released time at the beginning to prepare course materials, change their pedagogy, and master the computer.

4. Marketing. At the outset, we misjudged the market in Montgomery County. Although the County which the College serves was upscale, high per capita income and was the site of a number of high tech companies and national associations, we were caught between those who knew about computers but did not need the courses we were offering and those who needed our courses and did not have access or knowledge of computers. Even though we offered access to computers at the college, students had to come to campus which the program was designed to avoid. Moreover, experience proved that the greatest impact

on the market may be internal. If counselors, administrators, and faculty members know about the E-Mail system, they often can help students who are faced with scheduling or access problems.

A realistic market study of needs and capacities should be initiated first. Then target audiences should be contacted, groups which might benefit from the program (i.e. physically disabled organizations, single parent groups, unions, and weekly newspaper readers, especially in rural areas).

5. Finance. No institution should make a commitment to this type of instructional system without realizing that at the outset it will be more expensive than their traditional offerings. But, as with Montgomery College, which provided lap top computers, communications software and modems to faculty and loaned modems and software to students, it was an investment that will reap dividends in the years ahead. Up front costs are worrisome but if they are regarded as a long-term investment, the cost effective factor becomes reasonable.

An institution will need to finance the purchase for use or loan of several computers for faculty, as well as modems, and several types of software (word processing, communications, and data base software sometimes can be combined.)

6. Leadership. Instruction by computer interaction simply is not going to happen without a strong leader to pioneer in the process and with full administrative support. This leadership element pertains to faculty, too. In the beginning, the most respected and credible members of the faculty should be recruited to serve as role models for others on the campus. It calls for another type of leadership from the computer center which provides the technical support. They have to be patient and explain complex ideas simply.

Regarding dissemination, members of the staff already have written articles and a chapter in a book, and have prepared papers for conferences that came out of the experience with this project. Copies of speeches and clippings relating to the project are in Appendix III.

The most notable result of this project is that use of interactive computers is continuing at Montgomery College. In fact, the College has implemented it as an important component of the new Accelerated Degree Program, which now incorporates telecourses, E-Mail, and evening and weekend courses.

Funding for teaching ended in January of 1992, and since then, E-Mail was used in eight courses Spring semester, and in nine courses this fall (including two taught entirely by E-Mail and seven using E-Mail as a supplement to telecourses).

This computer conferencing or E-Mail project proved one other thing: An institution must make a long-term commitment. Programs such as this need time to grow, time to adapt computer instruction to the faculty and student body, time to attract faculty and students to the idea, and time for everyone to learn the process and to get used to a new form of pedagogy. Montgomery College is proof that long-range commitment will produce salutary results. It is now ready to move forward in its attempts to educate more citizens and increase access.

Appendix I--Evaluations

Appendix I-A: Outside Evaluation of The Montgomery College Interactive Teleconferencing Project by John Splaine

Appendix I-B: AED/FIPSE Computer Conferencing Project - Administrative Summary Report by Tim Peterson

Appendix I-C: AED/FIPSE Computer Conferencing Program - Campus Coordinator's Summary Report by Connie Cox

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Appendix I-E: Analysis of AED - Montgomery Community College Project Education Data by Philip Doughty

APPENDIX I-A

Outside Evaluation of The Montgomery College Interactive Teleconferencing Project

by John Splaine
Associate Professor
Department of Education Policy, Planning and Administration
Fall 1991

Evaluation Objective and Problem

The objective of this study was to determine the academic and cost effectiveness of the Interactive Teleconferencing Project (ITC), commonly referred to as "E-Mail" on the campus, at Montgomery College in Maryland. The major question of the study was: Were the ITC courses at Montgomery College effective in meeting their objectives of academic and cost effectiveness?

The following additional questions were part of the study:

1. What facilitating factors were present which helped the ITC project toward meeting its objectives?
2. What inhibiting factors were present which worked against the ITC project in meeting its objectives?
3. What else can be learned from the ITC project?

Evaluation Procedures

Previous studies of the Montgomery College ITC project had used questionnaires and some interviews. This study employed a structured interview where identified interviewees responded to closed and open questions in a session that took 45 to 75 minutes, depending on the respondent's knowledge of the project. The structured interview was chosen as a methodology because it has the following advantages:

1. The trained interviewer is able to probe for deeper explanations. Judgements then used in working with the qualitative data.
2. The trained interviewer is able to observe non-verbal and other cues in order to judge the validity and consistency of responses.
3. The skilled interviewer is able to gain cooperation in responding to questions, which may not be the case for the mailed questionnaire.
4. The skilled interviewer can usually obtain extensive usable data.

The disadvantages of the structured interview are:

1. The time involved in conducting each interview usually limits the number of respondents.
2. The qualitative data obtained in the interviews is often difficult to categorize.
3. There is little quantitative data, and statistical significance is absent.

The Montgomery College Office of Extended Learning provided the list of possible interviewees. The list provided 22 names, and this interviewer interviewed 17 from the list and one person who was not on the list. (Of the respondents, there were 3 administrators, 4 technical support personnel, 5 faculty, 3 administrative support personnel, and 3 students.) The reasons for not interviewing those on the list ranged from National Guard service during the 1991 war in the Middle East to potential respondents having moved.

The interviews were conducted from January to June, 1991. The length of the time period helped to control for variations because of the time of the year or periodic events at Montgomery College affecting the respondents. For example, if all the interviews had been conducted during May, 1991, the fact of final examinations and rushed schedules may have affected interviewee responses. Therefore, the interviews were conducted across time periods. The interviews took place in mutually agreed-upon locations, although three of the interviews took place over the telephone because of a lack of a good time or place to conduct the interview in person. For example, one student was about to deliver a baby and could only be interviewed by telephone.

Findings

The respondents included administrators, technical support personnel, faculty and students. The first set of questions asked about the respondent's role in relationship to the project. The entire "structured interview schedule" is contained in the Attachment. Some of the questions were used to confirm earlier responses and did not yield additional usable data. Only the questions that yielded useful data are analyzed below. The first set of questions yielded the following:

TO THE QUESTIONS OF WHETHER THIS PROJECT TOOK MORE TIME THAN A SIMILARLY INNOVATIVE PROJECT, 10 RESPONDENTS SAID IT TOOK ABOUT THE SAME, 6 SAID IT TOOK MORE TIME, AND 1 SAID IT TOOK LESS.

THE RESPONDENTS OFFERED THE FOLLOWING REASONS FOR THEIR PARTICIPATION IN THE PROJECT (THE NUMBERS IN PARENTHESES INDICATE THE NUMBER OF PEOPLE MAKING THAT RESPONSE):

. Exciting.
. Enjoy working with computers.
. Had been involved in computer conferencing.
. Had previously taken a course in computer science and wanted experience.
. Was an instructional developer and committed to the idea.
. Wanted to try it.
. Interested and encouraged the assignment (2).
. Was assigned.
. Was interested in telecommunications.
. Wanted some teaching experience.
. Looked interesting and had the equipment.
. Interested, able, and assigned.
. Good experience.

- . Was asked.
- . Thought it would be easier.
- . Better distance learning with this technology.

IN RESPONDING TO THE QUESTION: DID THE E-Mail COURSE MEET THE ACADEMIC OBJECTIVES OF A TRADITIONAL COURSE? 9 RESPONDENTS SAID YES. IN ADDITION, ONE EACH SAID THE FOLLOWING:

- . Yes, more so.
- . Yes, excellent.
- . Yes, very effective.
- . Yes, certainly the second time through.

Summary of the Data:

- . 13 clearly said yes.
- . 1 said no.
- . 4 responses were indecisive.
- . 1 said inadequate number of students participating to tell.
- . 1 said it is hard to tell but that it "looks good."
- . 1 indecisive said that from feedback he concluded that the bulletin board was the wrong medium.

WHEN ASKED ABOUT COST EFFECTIVENESS, THE RESPONDENTS MADE THE FOLLOWING COMMENTS REGARDING THE INITIAL COSTS:

- . Yes, it was cost effective (5).
- . Not cost effective at the beginning because of the hardware.
- . Yes, I already had the equipment (3).
- . The "Participate" system required an initial expense.
- . Not unreasonable.
- . For a new program, I do not believe it was an expensive program.
- . In the short run, no.
- . Yes, a number of colleges are going this route.
- . Yes, they were warranted.
- . Slightly less cost effective.
- . Yes, it was justified.
- . No, too much cost for the number of students served.

WHEN ASKED ABOUT THE COST EFFECTIVENESS ONCE OPERATIONAL, THE RESPONDENTS SAID:

- . Yes, operationally cost effective (7).
- . Yes, it is getting that way.
- . Yes, more than predicted.
- . Cost effective for certain people.
- . Yes, if you already have the equipment.

- The college loaned you what you needed.
- Less than the traditional once established. New construction less necessary - you do not need a room.
- Yes, normal for any personal computer operation.
- Yes, when prorated.
- If continued, it will be cost effective.
- Yes, it will decrease per capita with growing enrollment.
- The respondents estimated that students save travel costs between $1.50 and $20.00 a week.
- The respondents estimated that students saved between $0.00 and $30.00 a week on child care expenses.
- Other cost estimates ranged from paying $30.00 for long distance charges to saving $15.00 a week for cafeteria meals.

WHEN ASKED WHAT THE FACILITATING FACTORS WERE, THE RESPONDENTS INDICATED:

Leadership:
- Leadership's concept and experience.
- Administrative support (4).
- Leadership (2).
- The zeal and personal involvement of the principals (3).

Technical Support:
- Support person's help (6).
- lap-top computers purchases.
- Video tapes being available in the library.
- Technical staff were willing.
- Technical expertise.
- Growing frequent use of the computer.
- Good relations with other computer people.
- Science and math cluster people helped.
- 2nd and 3rd-year support better.

Instruction:
- Teachers (faculty) (8).
- Faculty interest.

Process:
- Interaction (3).
- Special seminars were good.
- Feedback.
- There were better explanations.
- Intimate connection with students.
- Had to read the material.
- Conferencing with other students.
- I was more prepared for class.
- Good teacher-student communication.

v

- Share questions and responses through the system.
- Can update old information.
- Respect and empathy shown.
- Desire to get together.
- Clear instruction.

Students:
- Wonderful students.
- Committed students.
- Student motivation.
- Students willing to work.
- Students helped other students.

Other:
- Timely.
- Travel reduced.
- Marketing.
- Students not commuting and parking.

WHEN ASKED: WHAT WERE THE INHIBITING FACTORS? THE RESPONDENTS SAID:

Technical:
- "Participate" did not work on this system (2).
- Bad start.
- Technical problems (7).
- Unpredictable "Enable."
- Technically frustrating.
- Needed a technical expert all along.
- Lack of operational answers.
- Technophobia (2).
- Lack of own space for E-Mail project at the beginning.
- Nature of the system a problem.
- Mistakingly assumed faculty and student technical knowledge.
- Technical ignorance.
- Lack of consultation with all technical support.

Process:
- Less interaction.
- Not face to face.
- Less computer interaction by the end.

Training:
- Not enough time to learn the system.
- Faculty did not learn or take the time to learn the system (2).
- Training (2).
- Lack of orientation.
- Lack of training (2).

Other:
- Skeptics reinforced.
- Too lonely.
- Bureaucracy (3).
- Lack of student interest.
- Fear that you are taking my students.
- Newness (2).
- Poor response numbers from student evaluators.
- Not enough students.
- Lack of teaching ideas of what worked.
- Scheduling (computer time) problems.
- Lack of institutional support.
- Marketing.
- Staff turnover.
- Mis-counseling students into courses.
- Our administrative problems.
- Rush job.

THE RESPONDENTS' EXPERIENCE AT MONTGOMERY COLLEGE RANGED FROM A FACULTY MEMBER AT THE COLLEGE FOR 23 YEARS TO A STUDENT IN THE SECOND YEAR OF TAKING CLASSES PART-TIME.

WHEN ASKED TO GIVE THEIR ASSESSMENT OF THE TECHNICAL SUPPORT, THE RESPONDENTS SAID:
- That it was outstanding.
- Year One was deplorable, but then got better.
- Excellent (3).
- Good to fair.
- People were wonderful.
- Good (3).
- Adequate.
- Very good.
- Once it got going, it was excellent.
- Fair at first, then excellent.
- At first inadequate, then good.
- Good to satisfactory.
- Poor.

THE RESPONDENTS MADE THE FOLLOWING RECOMMENDATIONS TO IMPROVE THE TECHNICAL SUPPORT:
- A written package of directions at the beginning.
- Training and distribute the materials at the same time.
- Have a computer specialist who wants to do this.
- Have compatibility of hardware and software from the beginning.

. Involve the technical people and faculty earlier.
. Have students personally attend the orientation sessions.
. Provide a manual of ideas specific to the system.
. More training.
. Provide computer manuals from the outset.
. Have a technical specialist for the program, especially the first 3 months.
. Inform people earlier who will provide the technical support.
. More people available to help out immediately.
. Provide an on-site computer person for the faculty.
. Provide technical help from the beginning.
. Proved more time for the technical troubleshooter to do the job.
. One or more available technical people.

WHEN ASKED TO GIVE THEIR ASSESSMENT OF THE WAY THE COURSES WERE MARKETED, THE RESPONDENTS SAID:
. Good (3).
. First year poorly done, then the marketing people targeted better.
. Fairly weak, traditional college marketing.
. Very poor.
. Fair.
. Not well at all.
. Good and got better.
. Could have done better: C+/B-.
. We tried, but we were buried on the last page.
. Did a good job.
. Should be marketed better.
. Found out about the course by myself. It was not in the forefront.
. Well enough for me. I knew it was there.

THE RESPONDENTS RECOMMENDED THE FOLLOWING TO IMPROVE THE MARKETING:
. Communicate academic expectations and computer needs as part of the marketing.
. We learned as we went along. So, market it better from the beginning.
. Target direct-mail to the likely student population.
. Target part-time students who have a computer.
. Target students 22 years and older.
. We need to hit more media.
. Have articles in newspapers.
. More awareness at registrar's office.
. College should print a brochure and distribute it with the schedule.
. Make it more prominent in the schedule of classes.
. Promote "On the Air" classes.
. Identify someone to handle the marketing, with the resources.
. Better planning, maybe 6 months before classes begin.

. Many people did not know about the program.
. Offer more interesting subjects.
. Use better advertising copy.
. Put it into other media.
. Communicate to other colleges.
. Continue advertising over time.
. Call specific occupational groups, professional and vocational organizations.
. Put posters in the library, computer rooms, and bulletin boards around campus.
. Use a market consultant.
. More prominent promotions by the campus.
. Involve campus marketing committees.

THE RESPONDENTS ASSESSED THE TEACHING IN THE FOLLOWING WAY:

. It was good. Faculty left alone.
. I received a lot of good comments on the teachers.
. A spectrum. Some have done excellent job. Some could have done better.
. Excellent to cursory.
. Excellent to pretty good.
. Less successful than the traditional classroom.
. Above average.
. Average.
. Faculty were familiar with their subject but had no computer knowledge.
. Looked excellent.
. Excellent (2).
. I did not lower my standards. I taught people different things. It could not be a lecture course.
. Pretty good. Improved my teaching because I had to be more thoughtful.
. Very good.
. Poor to fair.
. Looked like timely and concerned teachers.

THE RESPONDENTS MADE THE FOLLOWING RECOMMENDATIONS ON HOW THE TEACHING COULD BE IMPROVED.

. Training.
. Having manuals available.
. More systematic training all along.
. Experienced people provide a written set of recommendations.
. Would have been nice if there had been more interaction on the computer.
. If teachers had got on the system more, that would have made sure of a quicker response.
. Identify the faculty who are interested and willing.
. Do not waste time with faculty who are not interested technically, and have a system that can work easily - not an archaic one.
. Give some general information to students to make them aware of the complexity of

the subject.

- Need other media to complete the teaching package.
- Could have used E-Mail to be in contact with other students.
- Interaction between students and faculty started off strong but dropped off toward the end.
- I am sure teachers knew their subject, but needed better computer training.
- The electronic bulletin board was the wrong medium. They should have used the right medium in consultation with campus technical support staff.
- Give faculty more time to learn about the system.
- More training.
- Better marketing to the faculty involve more of them.
- Give it time to develop. Should be a 15-year project.
- Probably are some techniques that the faculty should know about. What is the research about teaching through E-Mail?
- Have on-line conferences.
- It took a while for the kinks to get worked out, then we got into it.
- More intense training in computers and pedagogy.
- Use different media.
- Released time for teachers.
- Select willing and competent teachers.
- Could have worked with teachers up front in order to reduce technical problems.

WHEN ASKED IF THE CONVENIENCE OF TIME AND PLACE WERE FACTORS IN RESPONDENTS' PARTICIPATION, THEY SAID:
All respondents indicated that being able to choose the time to get on the system and being able to choose the place (office or home) were positive factors in encouraging their participation.
The respondents added the following to their positive responses:

- Time was a big advantage. I could engage at any time when my energy was highest.
- I could work when I was ready.
- It saved time.
- Good for disabled.
- Jobs requiring travel. This was the only way.
- Time and not distance the issue in Montgomery County.
- The only way I could do it.
- Administrative forms easier to send and receive.

WHEN ASKED IF THEY WOULD PARTICIPATE IN OR TAKE ANOTHER E-Mail COURSE, THE RESPONDENTS SAID:

- Yes (3).
- Yes, for the self-starter.
- Absolutely (2).
- Yes, but not for everybody.
- Recommended for students who are full-time employed or have a family.

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. Recommended only for some who have children or who cannot attend classes for some reason. It is better for the more mature person.
. Yes, eagerly.
. Sure, it is part of the real world.
. Can you really teach by remote control?
. Yes, for some students.
. Yes, it improves computer skills.
. Yes, scheduling classes usually a problem.
. Yes, it promotes verbal and writing skills. It is like a writing center linked in people's houses.
. Yes, but for some, not others. Aimed more for disabled, hearing-impaired, or for those who will not or cannot come to campus.

THE RESPONDENTS RECOMMENDED THE FOLLOWING IN EFFECTIVELY IMPLEMENTING E-Mail COURSES:

. Student and academic social interaction needs to be created in some way (4).
. More up-to-date media need to be used. full-motion video, multi-colored, multiple displays, and graphics with sound (5).
. Have more phone lines for teleconferencing (2).
. Stress the importance of the orientation session (6)
. Hardware made easily available.
. Have a strong technical support system (6).
. Have good professors.
. More professional and targeted marketing (2).
. Have to have some face-to-face contact between professors and students (5).
. Special orientation provisions should be made for the disabled.
. Have on-line conferences for interaction.
. Inform students of what they will need to complete a course (2).
. Involve faculty in course selection from the beginning.
. Administrative, faculty, and staff support should be widespread (2).
. Have computer training for faculty and students (3).
. Need faculty who like to write.
. Need faculty with strong subject matter who can spend time with technical matters.

In working with the above data, the following were taken into consideration:

1. Care was taken to keep the respondents' comments in context. Even though the above are not direct quotes, the evaluator attempted to keep the summaries as close to the intended language as possible.
2. If the respondents did not respond fully to each question, the evaluator used only comprehensible responses in the above summaries.
3. The interview method allowed the questions to be rephrased when it was clear a question was misunderstood by a particular respondent. care was taken to preserve the

integrity of the question.

4. Similar data turned up in response to different questions. The evaluator considered this phenomenon before arriving at the conclusions in the next section.

CONCLUSIONS

1. The major question of this study was: Were the ITC courses at Montgomery College effective in meeting their objectives of academic and cost effectiveness?

Thirteen respondents said yes, four were indecisive, and one said no to the part of the question concerned with meeting academic objectives.

In regard to cost effectiveness, the majority of respondents indicated that the project was cost effective, or that the costs were reasonable for an innovation of this type. Also mentioned was that the cost effectiveness increased as the project continued.

One respondent said that the project was not cost effective considering the small number of students served.

As a result of the respondents' responses, it is concluded that the ITC project at Montgomery College did meet its academic objectives and was cost effective for a project of this type.

2. What facilitating factors were present which helped the ITC project toward meeting its objectives?

The respondents indicated that the project's leadership was essential in obtaining its objectives. Also identified as facilitating factors were the faculty, students, and the process - particularly faculty and students' efforts at interaction.

3. What inhibiting factors were present which worked against the ITC project in meeting its objectives?

Technical difficulties clearly emerged as the primary inhibiting factor. Also identified was the quality of the training, the bureaucracy, and the newness of the project.

4. What else can be learned from the ITC project?

(a) The convenience of time and place was clearly identified as a motivating factor for students and faculty in participating in the courses.

(b) The generally positive experiences in this project led the majority of respondents to indicate that they would participate in an ITC course or project again.

RECOMMENDATIONS

Whether at Montgomery College or another institution, the following major recommendations seem warranted. In addition, the individual recommendations that have been reported in the **Findings** section are worth considering.

(1) Careful planning, involving all those who will be called upon to provide technical support, should occur as soon as the project's objectives are identified.

(2) Faculty need to be consulted. Faculty who are willing to be part of an innovation need to be identified and recruited at an early stage. Then a training process needs to be implemented and on-going.

(3) The marketing needs to be targeted, creative, and systematic. Focus groups could help in identifying marketing strategies for the targeted groups.

(4) The respondents also recommended in implementing ITC courses that making sure there were was both some social and academic interaction was important. This could include an orientation session, computer conferencing, and some face-to-face contact between teachers and students.

Some of the participants recommended that additional media should be added to the electronic bulletin board and video tapes. Among these might be multi-colored, multi-display graphics, and sound.

Attachment

Structured Interview Schedule
adapted for
Administrative, Faculty, and Student Respondents
by John Splaine

(1) What was your role in the implementation of the ITC project?

- (A) What was your position at the time of your participation in the project?
- (B) What was your responsibility in relationship to the project?
- (C) Was your participation part of your assigned load and/or part of your normal job?
- (D) Did you get additional compensation for your participation?
- (E) Were you provided with enough time to complete your work in regard to the project?
- (F) How much time per week did you put into the project?
- (G) Did the work take extra time that a similar project like this might not take (extra prep time)?
- (H) What influenced you to participate in the project?
- (I) How long have you been at Montgomery College?

(2) Was ITC effective in meeting its academic and cost effectiveness objectives?

- (A) Specifically, academic objectives:
- (B) Specifically, cost effectiveness objectives:
  - (i) Initial costs:
  - (ii) Operational costs:

(3) What factors helped ITC meet its objectives?

(4) What factors worked against ITC in meeting its objectives?

(5) Would you please assess the following:

- (A) What was/is your assessment of the technical support?
- (A1) How could the technical support have been improved?
- (B) What was/is your assessment of the way the courses were marketed?

(B1) How could the marketing have been improved?

(C) What was/is your assessment of the teaching?

(C1) How could the teaching have been improved?

(D) What was/is your assessment of the convenience of taking an ITC course?

(D1) How could the convenience factor have been improved?

(i) Was the convenience of time a factor in your participating?

(ii) Was the convenience of place a factor?

(iii) (Specifically for students)

(a) How much would you have spent on travel if you took a regular course versus ITC?

(b) How much would you have spent on a babysitter?

(c) How much money would you say you saved after the initial start-up costs?

(E) Would you participate in or take another ITC course?

(i) Why?

(ii) Why not?

(F) What is your view regarding the completion of a complete 2-year degree through ITC?

(i) How could the implementation of ITC help students earn the AA degree and/or certificate?

(ii) What suggestions would you have for implementing an ITC program of courses leading toward an ITC degree?

(6) What else would you like to say about the ITC program?

APPENDIX I-B

Montgomery College
AED/FIPSE Computer Conferencing Project
Administrative Summary Report

by Tim Peterson
Instructional Dean
Extended Learning Services
Fall 1991

Introduction

Montgomery College, a multi-campus community college located in the metropolitan Washington, D.C. area, recently completed a three-year FIPSE funded pilot project to explore both the instructional and cost effectiveness of electronic mail (E-Mail) as an alternative to traditional classroom lectures and discussion. The project was sponsored by the Academy for Educational Development (AED), a private nonprofit educational research and consulting organization in Washington, D.C.

Like many pilot programs, the project evolved in several unforeseen ways due to a number of problems. However, as reported in the external evaluator's report on the project, many of the individuals associated with the pilot view it as a success. In fact, E-Mail courses are now well established at the College, and there is a growing body of evidence from other institutions around the country that the use of this form of instructional delivery will continue to improve and expand within higher education. For example, both the University of Phoenix and the New York Institute of Technology offer complete degree programs via E-Mail.

This report provides a brief overview of how Montgomery College developed its E-Mail system, a basic description of the costs involved, and a few recommendations to other administrators who might wish to replicate such a system. Other more descriptive and evaluative reports of the project are available upon request.

Why Use E-Mail?

Among all of the various technology based instructional systems employed by colleges and universities, telecourses produced for national distribution have been the most widely used, at least for lower division courses and among two-year institutions. Montgomery College has offered such courses for more than 15 years. Instruction by E-Mail offers many of the same advantages of telecourses: it eliminates scheduling conflicts; it doesn't require an exorbitant financial investment; and it can be used with a variety of academic subjects or disciplines.

In addition to these advantages, E-Mail can also dramatically increase student and faculty interaction if used properly. The lack of such interaction is frequently cited as the major shortcoming of pre-produced telecourses. Hence, we recognized that E-Mail could also be used to supplement and improve existing telecourses.

How Does It Work?

E-Mail can, and should, be used to replicate the kind of learning that occurs in a traditional classroom setting. Although the course structure may vary depending upon the kind of E-Mail system used, the particular course being taught, and the instructor's pedagogy, the emphasis in the Montgomery College project was to create a high level of interaction between faculty and students and among students.

Interaction occurs primarily through a course "forum," to which all students registered for a specific course have access, and a private mail system. Students are given assignments via the system and are expected to discuss the assignments in the forum on a regular basis. Similar to the classroom, the instructor stimulates discussion through questions based upon reading or assignments, projects, etc., and gives feedback to selected individuals or to the entire class as he or she would in a regular classroom. Written assignments such as essays or term papers are submitted, graded, and returned as electronic files through an upload/download process.

Some faculty members have also met informally with students while others have scheduled campus seminars (and in some cases mandatory examination sessions) to further personalize their E-Mail instruction and discussions. However, we have encouraged faculty not to mitigate the convenience of the E-Mail system by requiring too many campus meetings. We have also urged telecourse faculty and students to take advantage of the system, but E-Mail usage continues to be optional and thus rather sporadic within telecourses.

What Are The Problems?

The two major obstacles to the effective use of E-Mail for instructional purposes are training and technical support.

Not every discipline can be taught via E-Mail, nor can all faculty and students benefit from it. Some faculty need to adapt their pedagogy, and nearly all students must be highly motivated and disciplined in order to complete E-Mail courses. Both faculty and students need some basic computer skills or they will become highly frustrated with E-Mail. This implies a certain level of orientation, training, and/or screening of faculty and students. Skill prerequisites obviously limit enrollments and access, whereas training requires planning, coordination, and resources (primarily staff time).

Technical support is also essential to running such a system. Even the most rudimentary PC-based bulletin board system (BBS) requires a knowledgeable system operator (sysop) who is readily accessible for troubleshooting, repairs, and advice.

What Are The Costs?

There are both start-up and ongoing operational costs associated with an instructional E-Mail system. The costs can vary dramatically depending upon the E-Mail system selected and the institutional budgeting system. These costs will be discussed separately, both in general terms and the way in which Montgomery College has dealt with them.

Start-Up Costs

There are basically five things that are required to set up a reasonably efficient E-Mail system:

1. A 386 personal computer with at least 2 megabytes of RAM.
2. Floppy disk drives, a 60 megabyte hard drive, and two 2400 baud modems - approximately $2,000.
3. Several software packages (i.e., DOS, a BBS program, a utilities package, etc.) - approximately $1,000.
4. At least two laptop or notebook computers with a 20 megabyte hard drive, a floppy disk drive, and some applications software (i.e., telecommunications and word processing programs, or some type of integrated program) to loan to faculty - approximately $3,000.
5. A system operator (sysop). Because this individual can be either a faculty or staff member, and doesn't necessarily need to be full-time, the cost can vary considerably.
6. A dedicated staff member to administer the E-Mail program. This can be an existing off-campus coordinator or a similar type of position, but the individual will need to become very familiar with the system and will need to devote quite a bit of time, perhaps as much as 50 percent or more, assisting faculty and students.

Although a less sophisticated system could be created for fewer dollars, the access and processing time would be much slower, while faculty and student frustration would be much higher.

It is also recommended that additional laptops (or modems and software) be purchased for other faculty who might wish to participate in the program but who lack these basic resources. We purchased a total of 14 laptops for faculty at a total cost of about $30,000, but prices have dropped significantly during the past 18 months. We also found that course enrollments increased after we purchased modems and telecommunications software to loan to students (we bought about 40 modems and 15 copies of a communications program for about $3,500). Many students and faculty now have access to personal computers, but only a relatively small proportion have modems or communications software and many are unlikely to purchase these items to take a course via E-Mail.

Some institutions may be able to use an existing mainframe computer for their E-Mail system, but we found that there are other trade-offs to this approach. Hence we opted for a PC system, which proved to be a better solution than the mainframe for us. Our experience suggests that you need to invest a minimum of $10,000 in hardware and software to set up an E-Mail system that will accommodate 100 or more students efficiently.

The personnel costs of getting started really depend upon the experience of the sysop and the time it takes him or her to purchase, install, and test the system. We provided our sysop (a full-time faculty member) with nine semester hours of release time per term for the first two semesters and three semester hours during the first summer of the pilot for his operation of the system. The Extended Learning Services unit paid for the part-time faculty who taught the courses the sysop normally would have had he not been awarded the release time.

Thus we spent about $12,000 for sysop support during the first year of the project ($500 per credit hour x 9 semester hours x 2 semesters + $1,000 x 3).

We also provided about 9 semester hours of total release time for faculty who taught the initial history and health courses at an approximate cost of about $4,500. The faculty used the release time to adapt their courses to the new instructional E-Mail system and to participate in the research and training aspects of the pilot project. New E-Mail instructors are now awarded release time for such preparation on a highly selective basis (e.g., a chemistry professor will integrate the use of E-Mail in the new World of Chemistry course that will be offered for the first time this fall).

Operating Costs

Once the E-Mail system is up and running, there are three principal operating costs: support personnel, phone lines, and miscellaneous supplies (e.g., back-up disk or tapes). We have continued to award six hours of release time per semester and one hour in the summer to the sysop at an annual cost of about $7,000. We will offer a total of six E-Mail courses in the fall of 1991 with a limit of 20 students per course. A further increase in courses will probably require additional sysop support and thus an increase in time and cost.

The current Distance Learning Coordinator, who also has responsibility for off-campus and telecourses, has and will continue to provide administrative support for the program. She has devoted about half of her time to the E-Mail project thus far, but she will probably have to increase that if the program continues to grow.

Although we started with only two telephone lines on the system, we now have four at a total cost of about $145 per month. We think four lines can accommodate as many as 200 students provided that most of them do their assignments off-line (i.e., upload and download their files), use 2400 baud or faster modems, and use the system at different hours of the day and evening.

There are also some periodic maintenance, repair and replacement costs. We have spent about $2,000 a year on software upgrades, memory expansion, better modems, laptop repairs, etc. Given the rapid advancements in the technology, there is always the temptation to get the latest and greatest version of these items which, of course, can increase the costs equally as fast if not monitored closely.

Other Costs

The other obvious cost of E-Mail instruction is the same as it is for any other educational program, i.e., faculty salaries. As alluded to above and as any administrator knows, part-time faculty salary rates tend to be much lower than full-time faculty rates. That doesn't mean that E-Mail courses have to be taught exclusively by adjunct faculty, nor should they.

Ultimately, the cost of instruction is largely a question of institutional budgeting and accounting practices. At Montgomery College, E-Mail faculty are currently recruited from all three campuses by the Extended Learning Services/College of the Air Office. The appropriate campus instructional deans make the faculty appointments, which could be a part of a full-time faculty member's regular load, an overload, or a part-time instructor. The campus pays the salary and the credit hours generated by the course are attributed to the campus and thus determine, in part, the following year's campus budget, which is supported by both county and state funds as well as tuition and fee revenue.

An alternative approach, and one that is being considered at the College, is to budget for E-Mail courses the same way we do telecourses, which receive state aid but not county tax support. Under this approach, the process of recruiting and appointing faculty would remain the same but the College of the Air program would realize the revenue generated by the E-Mail courses. The program would pay the faculty salaries albeit at the part-time rate since the COA budget is separate from the overall College operating budget and thus does not receive county support.

The real question is whether or not E-Mail costs are comparable to other instructional approaches given comparable sources of revenue. If you take into account the capital costs of building a campus or renting space in order to provide traditional classes, then the start-up costs of E-Mail are modest by comparison. The operation and maintenance costs of the E-Mail system, in the long-run, are also likely to be much less expensive than those for a classroom facility. Thus we think the E-Mail system will ultimately prove to be no more expensive than traditional courses on a cost-per-FTE basis.

Summary

The Montgomery College/AED project demonstrated both the pros and cons of using E-Mail as an instructional alternative to traditional classes. We learned that not all faculty and students like it or can use it effectively, and that it requires a certain level of training and technical support. However, like telecourses, E-Mail offers some distinct advantages (such as convenience) over traditional lecture/discussion courses, and that it can be reasonably cost-effective when juxtaposed against the capital and operating costs associated with campus-based instruction.

APPENDIX I-C

Montgomery College
AED/FIPSE Computer Conferencing Program
Campus Coordinator's Summary Report

by Connie Cox
Distance Learning Coordinator
Fall 1991

Introduction

In August of 1990, I assumed the role of distance learning coordinator for Extended Learning Services and in that position began coordination of the AED/FIPSE project. Although my primary responsibilities for the project involved faculty and program development activities, I soon became involved in other facets of the project including technical support to students and the systems operators in the use of the Bulletin Board System and development of our marketing/publicity initiatives. It is from this perspective, working with the project in its final grant year, that I submit my reflections regarding the value of the computer conferencing project.

The following report will address three broad program areas providing information to assess the effectiveness of the project: attitudes, administrative issues and results. Student, faculty and administrative perspectives are included.

Attitudes

The attitudes with which students, faculty and administrators approach their involvement in a project such as computer conferencing greatly determine the ease with which the project will run, its longevity and its ultimate success. Students involved in the AED project have generally entered into the project with excitement about the use of electronic mail as a means of instruction and as a convenient way of completing coursework. Students enrolled in the electronic mail courses have typically been full-time working adults, older than the typical 18 year-old college student. Students have generally demonstrated some familiarity and comfort with computers, although some students enter our E-mail courses as "last resorts," registering for the only remaining open course sections. Accurate information and advising regarding prerequisite computer skills for using the E-mail system and regarding course expectations and demands (particularly the need to be disciplined and self-motivated) are important elements contributing to a positive attitude toward learning in an E-mail course.

Faculty have been recruited based on interest and willingness to work with and learn the

Bulletin Board System. Depending on funds budgeted, additional compensation could be awarded to develop new courses via the E-mail mode. Neither additional compensation or planning time were consistently feasible options for all faculty, however. Compensation, technical support and training and support from department chairs are issues critical to positive attitudes toward teaching E-mail courses.

Administrators' support and positive attitudes about the value of E-mail courses also critically affect the ultimate success of such a project. Support from department chairs and deans for faculty teaching courses is essential as is an acceptance that E-mail courses are valid and equivalent to traditional credit courses. Support from upper level administration in terms of acknowledging the value of the project and including project efforts in priorities for college objectives in terms of financial support is necessary. Without college wide acceptance of the program, individual efforts are undermined, and the success of the project is stymied.

Administrative Issues

Four primary operational areas warrant specific attention in the planning of a computer conferencing project. These include: course selection, training, marketing and technical support.

Considerations regarding course selection should address both student and faculty needs. An enthusiastic student and/or teacher may not be sufficient to avoid complicated processes which inhibit the learning process. Courses which have worked well with minimal demands for training and special computer programs include history, health and technical writing. Courses which rely heavily on text reading and discussion and which assess performance through tests and essays lend themselves well to instruction via a bulletin board system and can be mastered relatively easily by students with minimal prior experience on computers. Courses such as computer applications or programming courses require specific knowledge and use of specialized software and computer commands, and an additional time requirement is imposed on faculty for effective maintenance of student files. Courses of this nature place an unusual time requirement on both students and faculty and really are appropriate only for students with a substantial comfort level using computers. Who should the E-mail courses serve? and what prerequisites are realistic? are questions that should be addressed early in the program development process.

Effective training on the use of the Bulletin Board System for both students and faculty is perhaps the most essential element to ensure success of the project. Students in E-mail courses are required to attend a 2-hour orientation session before courses begin. Our experience has been that for a good number of students, confusion still exists following this session, and the first few weeks are busy with calls for help. No assumptions can be made about understanding of basic terminology and functions. Individual training sessions have been conducted with faculty and questions addressed as needed. Our current support structure provides the part-time services of three staff/faculty members on a catch as you can basis. A designated and substantial block of time from a qualified computer support person is of paramount importance.

Both external and internal marketing and publicity efforts must be well planned. Although some mailings were done to specific markets and a few articles were run in local papers in the initial year of the project, publicity and marketing has primarily been focused through the traditional college schedule available to current students and mailed to county residents. E-mail courses need to be advertised in a distinct fashion so that attention is drawn to them as a new innovative course design. Publicity must also describe the courses and the manner in which they work with clear, uncomplicated language. Internal marketing is equally important to the successful marketing and recruitment of students. All departments and advisors must be made aware of the offerings and the specifics so that appropriate advising and referral can occur.

Technical support of the Bulletin Board System lies at the heart of the project. Without a smooth, efficient system operating problem-free, frustrations occur for students and faculty. Our systems operators have fulfilled that role remarkably well, responding in a timely fashion to technical problems for students and faculty. Realistic expectations should be determined early as to the options available and the extent to which staff can investigate problems and provide assistance to those with different or unique systems or software.

Results

Following the third year of the pilot project on computer conferencing, the increase in overall interest and the documented student outcomes speak to the success of the project. The growth in the project over three years is significant, increasing from one health class of four students to a semester offering four courses with a total enrollment of 65. Students themselves are now inquiring about additional courses to be offered via the BBS and faculty are expressing interest in continuing with the project or developing new courses. This interest verifies the value and quality of the experience for students and faculty and indicates that E-mail is meeting a need. One positive outcome is the fact that the college has incorporated the project into the Extended Learning Services College of the Air program, so that these courses will continue and will receive some funding through that budget as the AED/FIPSE funding ends. Hopefully, this growth will generate more interest and support from administrative levels.

Student outcomes in terms of retention and performance roughly equate to outcomes evident in traditional college courses. A comparison of E-mail and traditional course students from the spring 1991 CS135 (Computer Applications) course serves as an example. A faculty member teaching both an E-mail and traditional section of the course provided both test scores and final grades for students in both sections of CS135. Final grades, for example, indicate similar performances of students from both groups and support the value and equivalence of the E-mail course. In the E-mail section, 39% of the class earned A's as compared to 35% of the students in the traditional section; 72% of the E-mail students passed with a C or better as compared to 78% of the traditional class students. 17% of the

E-mail students failed the course; 13% of the traditional class students failed. Since no formal study with controls or matched groups of students was conducted, these results must be read with caution. However, the similarity in outcomes suggests comparable experiences for E-mail and traditional class students.

Conclusions

The value of courses conducted through computer conferencing in terms of learning outcomes and convenience is apparent. Realistic expectations and thorough planning are critical to the start-up of such a project. The implementation of an E-mail program takes a considerable amount of time as does its actual routine operation. Time is needed also to allow for program growth and for interest to develop before success can be accurately evaluated. This is particularly true if the project is initiated through the efforts of just a handful of dedicated, supporters from the faculty and administrative ranks. Planning must consider all interrelated aspects of the program including external and internal marketing, appropriate course selection and advising, training for students and faculty and on-going technical support. Incentives must be provided for faculty to develop courses, and students must have a sense of receiving equivalent, quality instruction.

Strong leadership and vision provide the foundation for initiatives like the AED/FIPSE project. That vision and encouragement were provided to Montgomery College by the AED program manager, Dr. Donald McNeil, who we thank and acknowledge.

APPENDIX I-D

FACULTY E-MAIL EVALUATION

by Ben Acton
Associate Professor
Telecommunications Technology
Montgomery College
Fall 1991

1. ***How much computer experience did you have before this project?***

   Extensive! I installed, operate, and manage the Bulletin Board System (BBS) for this project.

2. ***How difficult was it to learn?***

   a. *The Bulletin Board System?*
   It took about three weeks between the fall and spring semesters, 1989 - 1990, to install and customize the system to our requirements. I'm still working on it.

   b. *Procomm?*
   I've been using Procomm for the last three years, and I'm still learning how to use it more effectively. It's still one of the most powerful, yet easy to use comm packages available today.

   c. *Enable?*
   I know enough about Enable to be able to use it in a limited fashion, enough to be able to upload and download from the BBS and generate something on the word processor. Enable is NOT one of my favorite packages! I learned what I had to so that I could set up the faculty laptops to use the BBS and respond to help requests. Other than that, I try to avoid using Enable.

   d. *Other word processing or communications systems?*
   My favorite word processor is Microsoft's Word for Windows. I muddle through Word Perfect. I've used other comm packages but Procomm Plus is still my favorite. I really recommend having everyone use Procomm Plus as much as possible.

TIME

3. ***How much time did you spend learning:***

   a. *The Bulletin Board System?*
   I spent about 4 weeks between semesters, 1989 - 1990, learning the Major BBS, installing, and customizing it. I had to learn more when we upgraded to release 5.11

last summer. I spent about a week on that one.

b. *Procomm?*
I can't say how much time I spent on this one because I gradually learned as I went along. I'm still learning.

c. *Enable?*
Well, I guess it took me 8 to 12 hours to learn enough to set up the laptops for Enable.

d. *Other word processing or communications systems?*
I can't say. I learned them gradually, incrementally as required.

4. ***How much time did you spend adapting course materials?***

My TC students used the BBS as a hands-on lab exercise, and a homework exchange media. I guess I spent 8 to 16 hours devising the assignments specifically related to the BBS.

5. ***How much time did you spend communicating with students by:***

a. *Computer?*
This varied, depending on several factors, such as specific lab assignments. At the peak times, I guess I spent 2 to 6 hours per week, but usually less than 1 hour a week.

b. *Telephone?*
Usually less than 1 hour per week.

c. *In person?*
I scheduled 2 office hours a week in the spring semester. I estimate that only a quarter of that time was used with students.

QUALITY

6. ***Compare your traditional sections with the computer conferencing section in terms on:***

a. *Completion of assignments on time.*
Since my TC students were only using the BBS as a lab accessory during a

conventional class, there were minimal problems beyond the usual.... how do I log on, how do I upload/download, etc.

b. *Your interaction with students.*
In my TC classes, we freely discussed BBS matters in the classroom, and discussed class material in the BBS. One was an extension of the other.

c. *Interaction between students.*
There seemed to be little interaction on the BBS itself, mainly because we had the weekly traditional classes to interact.

d. *Learning outcomes.*
My objective in using the BBS as a homework/lab vehicle was to acquaint students with the basic technology and techniques of communication. I am not sure, but I think that objective was achieved. I had a few reactions from students. "I've never done this before, and I was afraid at first, but now I think it's fun!" "This isn't as complicated as I thought it would be."

e. *Grades.*
Nothing surprising here. Those who worked at it got a lot out of it and got better grades. Those who did the minimum got lesser grades. In the exams, I included questions specifically concerning their BBS experiences. Some got, some didn't.

f. *Student satisfaction.*
I think students appreciated the experience. See my comments in d. above.

7. ***Briefly summarize assignments/instructions that worked well via this mode:***

Specific step-by-step procedurally oriented assignments worked best. If I outlined the steps, sometimes keystroke by keystroke, students followed along well. When I left things open ended, often the wrong end got opened. After much repetition, they got the procedural issues down and then we could concentrate on the why's and analysis aspects.

8. ***Briefly summarize assignments/instructions that DID NOT work well via this mode.***

Many assignments that ASSUMED backgrounds and skills, such as PC keyboarding, BBS navigation, or PC-DOS familiarity often ran into trouble. "What's a subdirectory? " "How do I print a screen?" "How do I use the COPY command?" "F2?" "How do I exit from the BBS?" "ASCII text file... how do I do that?" "I downloaded the file but now I can't find it! Please send it to me again." "I started the upload but I couldn't see the text on my screen. What's wrong?"

9. ***Do you have any recommendations regarding:***

a) *Prerequisite skills for students taking an E-Mail course in your discipline?*
Students should be PC-DOS literate! If they have had at least the degree of familiarity with DOS as is offered by our CS121 PC/MS DOS I, it's a big help! If they are using Apple Macs, or Commodores, or whatever, they should be able to use it well.

Students should have basic keyboarding skill. Typing ability is a tremendous help, but lacking that, just being familiar with the PC keyboard is a boon. Some one-finger typists who know the keyboard can move along quite well.

Students should have, and be able to use, a word processor or text editor. Remember that these students are having to cope with several problems at once. They are learning to

1. use the PC;
2. use a comm program and modem configuration;
3. access the BBS;
4. navigate around in the BBS;
5. upload/download;
6. understand the subject matter of the course (raison d'etre).

Students must be fully aware of the necessity of self-discipline and scheduling. The weekly rhythm of class meetings and professorial presence is missing, thus making it too easy to take the "manana" attitude.

b) *Marketing ideas?*
Marketing should be thought of as two aspects. First, there is general public awareness of this learning media and its availability. This helps people think of the media, and the college, when they consider taking courses. We must overcome the "I didn't know I could take courses that way!" reaction. More needs to be done to show that these courses (COA and e-mail) can provide a substantial part of the requirements for degrees and certificates. Show some sample curricula and how these media courses fit in. Tie them into the Weekend College concept. Provide specific real-people examples of how these media helped people achieve their goals with reduced time and hassle.
Housewives and househusbands, disabled, prison inmates, those who work odd or irregular hours, etc. Dig up some of these cases and publicize them. Put them in news quips, human interest articles, and press releases. We cannot sell these distance learning concepts as THE way to go, but as an alternative educational delivery method which complements and supports the rest of the college efforts.

Now the second aspect. We must aggressively target those who specifically would most likely benefit from and would most likely enroll in the courses. Part of this effort requires us to analyze our current enrollment to find out how they found out about us, what motivated them to enroll, how well they succeeded in the courses, how well they think their goals were achieved. I think we are already doing this analysis, but I haven't heard any results. College academic advisors should be more atuned to the distance learning offerings and specifically encouraged to present them as alternatives when counseling students. COA/E-mail banners and flyers should be prominently displayed in lounges, student activities areas, counselors bulletin boards, etc.

c) *Ways in which ELS can better serve you as an E-mail instructor?*

i. Have text books readily available at the orientation sessions for students to buy on the spot. Postal Service or UPS delivery of text books and materials must also be provided. We emphasize a convenient, reduced-hassle educational alternative and then mess it up with awkward restrictions on obtaining required materials. Students should be able to do most everything remotely as much as possible, including counseling, registration, obtaining materials, submitting assignments, and taking exams.

ii. Provide updated relevant material for the Schedule of Courses, and the News and Bulletins sections of the BBS. So far, I have been doing the Schedule of Courses list every semester, and there has been nothing in the News section. If timely, relevant material goes in there, we can announce it in the logon message. I can modify the News and Bulletins section so that it's a forum, and then ELS can just upload new material as needed. Users can browse and review the material just as in any other forum.

iii. We must update the User's Guide to include:
1. more specific examples of command usage;
2. a list of commonly asked questions and their answers;
3. explanations of recent system modifications and enhancements.

iv. We must also develop a supplementary Faculty Guide, to include suggestions for:
1. developing a schedule of course assignments and their delivery dates;
2. managing PC directories and files;
3. commenting on students work on the electronic media;
4. using the PHONE, not just the BBS;
5. encouraging e-mail dialog;
6. DAILY checking and responding on the BBS. Every other day or so just does not do it. Students need timely responses to their problems and questions.
7. Text book and supplementary material selection;

10. ***Other comments:***

LIBRARIES and EXTERNAL LINKAGES:

Our BBS has a library facility on it that has never been used. This is only one means of providing reference documentation. We need to develop electronic linkages with our campus libraries and other library and data base sources. Our own MUSIC system is being enhanced with improved e-mail features and possible improved external communications capabilities, such as Internet.

We should be exploiting the use of ISAAC and BITNET as a means of national and international outreach. Again, when we establish these facilities, they are NEWS items, and should be publicized as another feature of distance learning.

We must develop additional communications media alternatives. Some sort of effective voice mail system is required. Telephone tag is awful and phone recorders are an interim band-aid. Fax is now very prevalent and ELS should have a fax capability. In a short time, voice, image, and data switching will be common and ELS should be pushing for implementing that technology.

IMAGE and OCR:

We must be able to incorporate graphic images into our materials. To this end, an image scanner should be available to all faculty. Such material can be file transferred just as normal text documents. An OCR scanner is needed to put text documents into revisable form. Again, our BBS library section can serve well here. We must consult with our computer graphics and office technology staff, and get moving on this area.

PHONE LINE PROBLEMS:

Noisy, overworked phone lines are becoming more prevalent in this area. These manifest themselves as garbage on the screen, abruptly terminated connections, and aborted file transfers. The anger and frustration of faculty and students of the e-mail courses will increase due to these factors.

Another problem is that a large percentage of the user population is using 1200 baud modems, which, by today's standards, is SLOW. The common line speed now is 2400 baud. This speed is by far more respectable than 1200, but by today's standards, that is still a slow rate of data transfer. I recommend that we move toward installing 9600 baud V.32/V.42bis modems on the BBS, and that any future modem purchases for loaners to faculty and students be at least 2400 baud MNP level 5 or better. These modems not only have error detecting and correcting protocols built in, they also compress the data (squeezing out the redundant bytes). With these modems properly configured at installation, the effective throughput can be 4800 to 9600 baud, virtually error free, for the entire logon session! Currently, two of our BBS lines have Viva 2400 baud MNP5 modems. The other two are 2400 conventional modems.

At home and office, I use a 2400 baud MNP5 modem or a 9600 V32/V42bis modem. My effective data rates are 4800 and up with almost no errors. A family member may pick up the phone, not realizing I am online, and quickly hang up. I don't realize this happened because the modem internal protocols filtered out the interruption. Previously, such an interruption would have meant a screenful of garbage at least, or a ruined file transfer, or an aborted connection, followed by unprintable words and exchange of apologies!

Therefore, those using these new modems will be spending less time online because of the higher data transfer rates and will have fewer errors and aborts to cope with. With more courses being offered, our four lines will be used more heavily, so we need to encourage more efficient usage of the facilities. We may even be able to refrain from adding more lines.

Should this E-Mail system move to the academic mainframe, I recommend that CS provide these same interfaces.

SYRACUSE UNIVERSITY

SCHOOL OF EDUCATION

OFFICE OF THE DEAN

APPENDIX I-E

Date: May 24, 1990

To: Don McNeil

From: Philip Doughty Phil Doughty

Re: Analysis of AED / Montgomery Community College Project Education Data

I have carefully reviewed each of the sets of student demographic and evaluation data as well as faculty and computing center support personnel assessments provided by your office. As I interpret my task at this phase in the project, I should be attempting to synthesize the various kinds of data, analyzing each source for important and relevant observations and then suggesting next steps for you and your project colleagues to consider for next year.

My report will include mostly observations and judgments with several suggestions where appropriate. You have done quite a good job of collecting and summarizing the student survey data. The faculty interview summaries are very informative and the support personnel observations are particulary helpful in considering plans for next year. I will strive to be succinct and well organized in my following comments.

For documentation purposes I will start with a description of the data (and sources of data) received and reviewed. The rest of the report will be organized around three main themes - **I. Organization, II. Instruction, and III. Incentives.** Each of these will include observations and suggestions relating to the overall project, the college, faculty participating and students.

Data and Sources: Information was collected via survey instruments distributed in class from each of the enrollees of the four Fall (1989) courses involved in the study. This included two separate sections of Health 100, a one semester credit course, and two sections of History 201, a three credit course. One section of each course was delivered via an electronic mail format which did not involve face-to-face interaction between faculty and students or between students themselves. Although not a standard requirement of the E-mail approach, the total absence of meetings was deemed a component worthy of field testing during these field tests.

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The conventionally delivered (lecture-discussion format) sections of each course were taught by the same instructor as was managing the E-mail section. Survey instruments as well as personal interviews were employed to obtain data from both instructors on each of their two courses. Descriptive and comparative data were solicited by the project director so that plans for subsequent E-mail course offerings could be well informed. These survey and interview summary data were supplied for this analysis.

In addition, separate survey instruments were completed by three technical support specialists who assisted the faculty and students by installing the E-mail systems, interacting with project personnel on use and maintenance issues and subsequently installing a different support system when the original system failed during the middle of the semester. Summary data from those three surveys were also provided for this analysis.

Although not completely clear, nor complete at this point, the following table represents enrollment and completion figures for the two sections of each course. The numerical data do not adequately portray enrollment and completion data for all courses but one of the faculty interview summaries suggested that completion rates for both sections of the history course were about equivalent.

Fall 1989 Enrollment and Completion Data

	Students	
	Enrollees	Completed
Health 100		
Conventional		28
E-Mail	15	4
History 201		
Conventional		26
E-Mail	13	8

I. Organization: The data provided by faculty and computing center support personnel offer insights into several organization-related issues. Several of the ones meriting brief comment are as follows:

A. **Management and Leadership** - At the college level, clear, unambiguous messages from administrators on the importance of such a project will help emphasize the status of this venture. Faculty are particularly vulnerable to notions that work on high risk projects requiring considerable time for instructional development and personal skills expansion may not be valued. The presence of college and project leaders, all of whom voice support for the work is an important organizational factor.

B. **Administration** - Other items that perhaps call for additional review include 1) the recruitment and selection procedures (including standards) of students as well as faculty. Computing skills, grade point average and desire to learn at a distance appear to be relevant variables for consideration in the experimental E-mail courses. Similar types of selection criteria should also be included when considering expanding the technology-based delivery system to other courses, departments and especially faculty. Faculty orientation and resource support programs are to be endorsed along with the creation and implementation of sound student orientation and skill testing programs prior to beginning a course. Organizational plans and support for these kinds of activities appear to have been well received but additional work, particularly in support of the computing center support function is warranted.

II. Instruction: A project that stretches the limits of the relationship between instruction, communication, information and technology can count on multiple opportunities to improve. In the instructional improvement area, several merit comment.

A. **Design and Development** - The creation, production and delivery of well developed course syllabi, or perhaps more justifiably - full student course manuals, can easily be incorporated into existing word processing and desktop publishing systems. Such manuals could include the selected course readings, "discussion guides", exercises, written assignments requirements, testing or course performance requirements and grading standards. In more traditionally managed and delivered courses, many of these processes and standards are presented orally with frequent and often repeated opportunity for clarification and negotiation. It is evident from both student and faculty comments that the experimental courses require clearly stated course management and organization messages as well as easily accessible guidelines for using the E-mail system. With the mid course change in systems, this presented an even greater challenge for clear messages and channels of communication/information.

B. **Delivery of Instruction** in the traditional sense does not appear to have much relevance for the E-mail system. How instruction takes place, where it occurs and when are all variables that frequently are not issues in a conventional course. Whether to require live computer conferences, face-to-face orientation, mentoring or tutoring sessions, off line conferences, or to permit negotiations on types of practice, timing of exams, types of assessment or even course goals to be accomplished are issues that could be considered further.

C. **Outcomes and Evaluation** - Speculation on the increased amount of writing required in the E-mail course as well as the sense of improved communication skills must be considered in light of the shaky completion rates experienced by the E-mail course enrollees. How these rates compare to the rest of the college is not clear, but the data suggest that younger students and those with insufficient experience with computers had considerable trouble finishing.

How to improve on this record will remain a challenge for some time, but continuing to clarify the course entrance requirements, improving the syllabus/student manual, perhaps including live interaction or mentoring, and more frequent monitoring via quizzes, exercises or exams may help those with little previous experience in an open learning context.

It is interesting to note the tentative conclusion offered by faculty that student performance, among those who finished, was comparable across the traditional and E-mail courses. How this might fare with a higher completion rate remains to be determined but success for some appears to be assured.

III. Incentives: In addition to the organizational components and the instructional aspects of the project, one more important factor requires careful review. Each of the three sets of respondents (students, faculty and computing support personnel) included references to issues such as recognition, reward, satisfaction, feedback on performance, access, flexibility, work load, responsiveness and other similar notions. In one way or another, all of them can be viewed as comments on the importance and relevance of incentives. An instructional (and instructional management) system such as the one being tested requires considerable changes by all three sets of respondents. Brief observations and comments on each follow.

A. Students - Terms used by students or teachers that can be used to portray student comments about the incentives to participate include:

- Access - to information, to the course in general, to faculty and to other students

- **Responsiveness** - by faculty, of computing support personnel and of the institution in general
- **Support** - by faculty, computing support personnel, by computing software and via materials
- **Convenience** - in relation to commuting, day care, various time requirements and other family duties
- **User Friendliness** - of the software, the communication systems, the materials and college personnel in general

Obviously the range of support for and concern about these several notions was quite varied. Some were embedded in notes about grading standards and procedures. Others were not at all subtle nor hidden. For purposes of this review and subsequent planning, careful consideration of these components is in order so that many of the important potential value added aspects of the E-mail approach can be realized. Despite significant disincentives presented to the students by way of crashed systems, insufficient phone access, no face-to-face contact, changing course requirements and the like, those who completed the E-mail course voiced considerable satisfaction and encouraged continued development of the approach. This suggests that some powerful incentives are supporting the system - even as it was presented during the Fall semester.

B. **Faculty** - Not surprisingly, faculty who volunteered to engage in this experiment in professional role change were supportive and encouraging. However, several of their comments suggest areas for improving upon the rewarding elements of the E-mail system. These included:

- **Support** - for course and instructional materials development, for maintenance and improvement of the software systems, and for themselves as innovators
- **Development Time** - before beginning a semester, during a semester when changes are required, and after a course is completed when feedback suggests improvements are in order.
- **Recognition** - by peers, by project managers, by college officials and by students.

Employing a mix of technologies that significantly change the role and visibility of a faculty member requires particular attention to how faculty are rewarded, recognized, celebrated, supervised and mentored. Without some relative advantages, changes such as this innovation cannot be expected to persist.

C. **Computing Support Personnel** - One can only imagine what it was like for the computing center staff when the sky fell. In addition to other duties and systems to support, mostly non-instructional I imagine, this new intrusion into their world now was in shambles and the phone was never silent. Their comments and semi-encouraging support for the next trial of the revised system are important to consider. Two issues may serve to help make the point:

o **Role and Recognition** - Typically these support professionals are not viewed as front line troops in the instructional end of the business. This innovation requires that they become more accessible, continually responsive, constantly supportive, user friendly, and to not speak in tongues. How they are recognized, valued, monitored and again celebrated will continue to be an important aspect of the project.

o **Responsiveness** - Their desire to be viewed as responsive and supportive appears to have been severely challenged by the events related to the system failure. How the institution responded to them as they struggled to identify and solve the problems may be informative as to how they might respond when students and faculty line up for quick, insightful, simple, easily executed fixes to problems occasionally caused by the system but frequently related to someone else's "mistake."

This important component in this technology supported system will continue to be a critical piece even after the organizational and instructional development changes have been institutionalized. Improved student orientation to the system, responsible support and easy access to specialists will remain requirements just as library and registration and financial records support will continue to be important elements for the college. How each component views its role and is recognized for its contribution will continue to be important. Although not new or unique to this project, incentives for all are worth continued monitoring.

The (or at least one) bottom line for this analysis is that the academic institution is the key. How college leaders, faculty, current students and prospective students view alternative instructional delivery systems, new roles for college faculty and non-traditional roles for students will impact on recruitment strategies, facilities use and curriculum redesign. The next phase of this project should hopefully provide guidance on many of these issues.

Appendix II--Promotion Materials and Publicity

Montgomery
College
Maryland's Largest
Community College

INFORMATION RELEASE

CONTACT:
Office of College Relations
(301) 279-5310
Jennifer Davis, *News Writer*
Home: (301) 598-9074
Max Schaible, *Director*
Home: (301) 869-2257

August 10, 1989

MONTGOMERY COLLEGE OFFERS CREDIT COURSES BY ELECTRONIC MAIL THIS FALL

Students can take two Montgomery College courses this fall from the comfort of their own homes.

The college's new electronic mail system offers the credit courses--Principles of Healthier Living and U.S. History to 1865--to anyone with an IBM compatible computer.

Course information, assignments and discussion topics are sent through the system so that students do not attend any classes on campus except for an orientation at the beginning of the semester and a final exam at the end. Students can communicate with their professors and other students at any time of the day or night by dialing the college's mainframe computer.

The College will provide software and modems to students who need them.

The electronic mail courses are extremely useful for working adults, single parents, disabled students and anyone else who can't fit regular classes into their schedules.

For more information, call the Office of Extended Learning Services office at 279-5254.

- 30 -

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89-24

TRANSCRIPT

Montgomery College January 1989 Extended Learning Services

Site Coordinators Increase Off-Campus Support Services

Two new site coordinators have been hired to support the College's off-campus credit programs that are conducted at John F. Kennedy and Walter Johnson high schools. Al Collier and Jacqueline Janss staff the two respective schools each night that classes are in session. In addition to making certain that the facilities are open and operating, the coordinators distribute materials and provide information on College policies and procedures to both faculty and students.

Detailed information about the off-campus courses listed below can be found on the inside back page of the 1989 Spring Class Schedule. Most of the courses meet from 6:15-9:10 p.m. Call 279-5046 if you need a copy of the schedule.

Course Title	JFKHS	WJHS
Principles of Accounting I	—	M/W
Principles of Accounting II	T/H	W/H
Intermediate Accounting II	—	T
Auditing Theory and Practice	H	—
Business Finance	—	M
Art Appreciation	W	—
Introduction to Business	H	—
Statistics for Business Administration	—	T
Introduction to Computer Applications	T	—
PASCAL Programming	—	W
Advanced Microcomputer Applications*	T	—
C Programming Language	W	—
Data Base Management Systems	—	M
Principles of Economics II	W	T
Investment Strategies	H	—
Technical Writing	W	T
College Vocabulary Development	—	M
Food Service Sanitation	W	M
History of the U.S. from 1865	—	W
Elementary Algebra	W	—
Introductory College Mathematics II	—	T
Principles of Supervision	T	—
Real Estate Practice & Brokerage I	—	M/W
Real Estate Practice & Brokerage II	T/H	—
Real Estate Practice & Brokerage III	T/H	M/W
Business Law II	—	T
Personnel Management	W	W
General Psychology	T	W
Functional Spoken Spanish	T	M

Note: H = Thursday

*New course; Prerequisite: CS 135-Introduction to Computer Applications

Off-campus credit courses are also available at the Defense Mapping Agency, the Department of Health and Human Services, the National Institutes of Health and the Naval Medical Command.

Health and History Courses To Be Taught Via Computer Conferencing

Montgomery College will offer two courses entirely by computer conferencing during the spring semester as part of an experimental project supported by the U.S. Department of Education and the Academy for Educational Development, a private nonprofit research organization.

HE 100–Principles of Healthier Living and *HS 201–American History to 1865* will be taught by Dr. Hazel Pflueger and Karen Miller respectively, who will substitute computer conferencing (a sophisticated electronic mail system) for traditional class lectures and discussions. Although students will not have to attend class sessions, they must have access to an IBM compatible computer and a telephone modem. The experimental courses will cover the same material as the lecture courses, but they will require additional readings and good writing skills in order for students to use the conferencing system effectively. Mature students who work full-time should find the experimental courses especially convenient and appealing.

For more information, call the Office of Extended Learning Services at 279-5254.

Assessment of Prior Learning Program Provides New Option for Adult Students

Mature students who have acquired college-level knowledge or skills in certain computer science, management and office administration subjects may be awarded academic credit without enrolling in those courses under a new pilot program being conducted by the College during the spring semester.

Students who can demonstrate knowledge of the material covered in CS 110, 135, 136 and 225; MG 101 and 102; OT 104 and 204, and who complete an eight-week noncredit workshop entitled *Documentation of College-Level Learning,* will be able to accelerate their degree progress through this program. A special application and interview are required for admission into the program. Enrollment will be limited and interested students should attend an Assessment of Prior Learning (APL) orientation scheduled for 6–7:30 p.m., Thursday, January 12, on the Rockville campus. Call 279-5254 for more information.

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TRANSCRIPT provides county residents and organizations information about Montgomery College extension programs and services. Call 279-5254 for more information.

TRANSCRIPT

Montgomery College | Fall 1989 | Extended Learning Services

Credit Courses Offered at Six Off-Campus Sites

Montgomery College extension courses can help you earn a degree, improve your job skills or enrich your personal life. In addition to the courses being offered at John F. Kennedy and Walter Johnson high schools listed below, a limited number of courses are also available at Health and Human Services, the National Institutes of Health, the Naval Medical Command and Seneca Valley High School. Look inside the back cover of the Fall 1989 Class Schedule for complete details or call 279-5254 for more information.

Course Title	JFK	WJHS
American Government	X	
Auditing Theory and Practice	X	
Basic English II		X
Business Law I	X	X
C Programming Language	X	
Computer Concepts	X	X
Data Base Management Systems		X
Elementary Algebra	X	
Federal Income Taxation I	X	X
Food Service Sanitation	X	X
Functional Spoken Spanish	X	X
Fundamentals of Speech	X	
General Psychology	X	
History of Western Society and Culture		X
Intermediate Accounting I		X
Introduction to Computer Applications	X	
Introduction to Marketing	X	X
Introductory College Mathematics I	X	X
Morality and Contemporary Law		X
Principles of Accounting I	X	X
Principles of Accounting II		X
Principles of Economics I	X	X
Principles of Healthier Living	X	X
Principles of Management	X	X
Real Estate Practice & Brokerage I	X	X
Real Estate Practice & Brokerage II		X
Statistics for Business Administration	X	
Technical Writing	X	
Techniques of Reading & Writing I	X	X

Real Estate Program Expands to Upper County

Beginning on September 18, two of the three Real Estate Practice and Brokerage courses required for the state brokers' exam will be offered sequentially at Seneca Valley High School. The courses will be held on Monday and Wednesday evenings and each will last about six weeks. The third course will begin in January.

Telecourse Program Options Grow

College of the Air students have a growing number of options that make telecourses an extremely convenient way of earning college credit. Nearly a dozen courses are broadcast on PBS and the College cable stations which can also be videotaped on home VCRs or viewed on any of the College's three campuses. Midterm and final exams are also now given on all of the campuses so students only need to attend three sessions at the Takoma Park campus to complete a telecourse. Call 587-9216 for more information about telecourses.

Electronic Mail Courses Now Offered

Now you can use your personal computer to take two courses offered through the College's new electronic mail system for students. Class discussions and course assignments for *American History to 1865* and *Principles of Healthier Living* can be completed through PARTICIPATE, a computer conferencing program that runs on the College's academic mainframe computer.

You don't need to be a computer whiz to take these courses. If you have access to an IBM compatible personal computer and some familiarity with basic computer concepts, you can complete your assignments at a time that's convenient to your schedule. The College will even provide the software, and loan you a modem if you need one, to link your PC to the College computer. Call 279-5254 to find out more about this exciting new way to learn.

ELS Student Advances Because of MC Courses

After a 17-year hiatus from the workforce, Beverly Jefferies decided to pursue a career but discovered she lacked the education to obtain her goals. She found an entry-level job and started taking MC extension courses in writing and management. Three years later she received a job promotion. She's still taking courses because "though happy in my current position, I have decided to seek a degree in business management at the College. . .to strive for higher career and educational goals." Like many of our students, Beverly has found the attention and expertise of the MC faculty to be the key to her learning. We wish her the best and hope that she might be an inspiration to others who may lack the confidence, but not the capacity, to learn and excel.

TRANSCRIPT provides county residents and organizations information about Montgomery College extension programs and services. Call 279-5254 for more information.

TRANSCRIPT

Montgomery College Fall 1990 Extended Learning

TRANSCRIPT is the newsletter of Extended Learning Services.

Knowledge for the '90s

Accelerated Degree Program Planned

Part-time students will soon be able to complete a degree in just three years through a new Accelerated Degree Program (ADP). A combination of one evening, one weekend, and one telecourse each semester will allow you to earn a degree without disrupting the rest of your life.

This new program will offer a choice of business or humanities courses leading to an Associate in Arts degree in General Studies. It's the perfect program for busy people who can't attend classes full-time.

The official ADP doesn't begin until Spring 1991, but you can start taking classes this fall. Call 279-5254 for information.

Telecourse Program Enhanced

Telecourse students can now take tests or view course tapes on all three campuses. A new fax machine and a new reserve "library" on the College of the Air (COA) electronic mail system will also be added to the program this semester.

You can choose from a dozen telecourses this fall including a new COA course, HS 151 - History of Western Civilization (TV Title: The Western Tradition).

Call 587-9216 for information.

TRANSCRIPT provides county residents and organizations information about Montgomery College extension programs and services. Call 279-5254 for more information.

Fall 1990 Off-Campus Courses

Call 279-5254 for details about these and other off-campus courses at government and company sites.

Course Title	JFK	WJHS
Principles of Acct I	x	x
Principles of Acct II	x	
Intermediate Acct I		x
Federal Income Tax I	x	x
Auditing Theory & Prac	x	
Business Finance	x	
Art Appreciation	x	
Introduction to Business	x	
Statistics for Business	x	
Computer Concepts	x	x
Intro to Computer Appl	x	
C Programming	x	
Principles of Econ I	x	
Tech of Read & Writing I	x	x
College Vocabulary Develop		x
Creative Writing	x	
Food Service Sanitation	x	x
Functional Spoken French	x	
Prin of Healthier Living	x	x
History of U.S. to 1865		x
Crises of 20th Century	x	
Elementary Korean	x	
Elementary Algebra	x	x
Inter Algebra & Trig	x	x
Principles of Management	x	
Real Estate Brokerage I	x	x
Real Estate Brokerage II	x	
Business Law I	x	x
Human Relations in Mgmt		x
Ethics of Science, Medicine & Health Care	x	
General Psychology		x
Functional Spoken Spanish	x	x
Fundamentals of Speech	x	

JFK = John F. Kennedy High School
WJHS = Walter Johnson High School

TRANSCRIPT

Montgomery College Fall 1991 Extended Learning

Knowledge for the '90s

Fall 1991 Off-Campus & Telecourse Offerings

Course Title	JFK	WJH	COA
Elementary Arabic I	X		
Principles of Acctg I	X	X	
Principles of Acctg II	X	X	
Gov't/Nonprofit Accounting	X		
Federal Income Tax I	X	X	
Color	X		
Intro to Business		X	X
Stats for Bus Admin	X		
Oceanus			X
Chemistry and Society			X
Computer Concepts	X		X
Intro to Computer App	X		
BASIC Programming		X	
C Programming	X		
Data Base Mgt. Systems		X	
Principles of Econ I	X	X	X
English Lang I		X	
Techniq of Read & Writ I	X	X	X
Intro to Creative Writ	X		
Writing Doc & Proposals		X	
Food Service Sanitation	X	X	
Functional Spoken French	X		
Princ of Healthier Living		X	
Hist of the US Part I		X	X
Elementary Korean I	X		
Elementary Korean II	X		
Elementary Algebra	X	X	
Intermed Algebra & Trig	X	X	
Principles of Management	X		X
Principles of Supervision		X	
Consumer Behavior	X		
Real Estate Prac&Brok I		X	
Real Estate Prac&Brok II		X	
Intro to Marketing			X
Business Law I	X		
Medical Terminology II	X		
Intro to Philosophy	X		X
American Government		X	X
General Psychology		X	X
Child Psychology	X		
Functional Spoken Spanish	X	X	
Intro to Sociology			X
Aging in America	X		

JFK—John F. Kennedy High School
WJH—Walter Johnson High School
COA—College of the Air

Additional ELS Sites

Off-campus courses are offered each semester at various government and company sites. Additional Fall locations include: Department of Health & Human Services, Rockville; National Institutes of Health, Rockville; Naval Medical Command, Bethesda; Association for Retarded Citizens, Silver Spring. Call (301) 279-5254 for details or refer to the Montgomery College Fall 1991 Class Schedule.

Chemistry Via College of the Air

Take advantage of a new, unique opportunity of completing a lab science course by combining COA and electronic mail. Chemistry and Society-CH 109 will be offered this Fall as a COA course with weekly broadcasts on Channel 22 and Montgomery College Cable Channel 51. Seven Saturday labs will be held at the Rockville campus. An additional feature is the use of electronic mail for regular communications with other students and the instructor.

Margot Schumm will be the instructor for the course. Professor Schumm participated in the development of the telecourse program and is recognized for her innovative efforts in the chemistry field.

For more information, call Extended Learning Services (ELS) at (301) 279-5254 or Professor Schumm at (301) 251-7633.

Expanded Offerings of Computer Conferencing/Electronic Mail Courses

If you have access to an IBM compatible personal computer and are comfortable with basic computer commands, you should consider taking courses conducted via electronic mail. Assignments and "discussions" occur via computer conferencing at times convenient to you. An orientation session is offered, and instructors may schedule periodic on-campus session or exams. ELS can loan modems and telecommunications software on a first-come, first-served basis.

Fall 1991 courses include: Personal Finance, Introduction to Computer Applications, C Programming, Technical Writing and American History. Call ELS at (301) 279-5254 before registering.

TRANSCRIPT provides county residents and organizations information about Montgomery College extension programs and services. Call (301) 279-5254 for more information.

Montgomery College
Extended Learning Services

EARN COLLEGE CREDIT AT HOME

* Use your personal computer to take MC courses by electronic mail

* No class attendance required

* Communicate with faculty and other students anytime day or night

* Software and modems provided by the College

* Training and technical support available to help you get started

* Courses can be applied to any MC degree program (HE 100-PL2 and HS 201-PL3)

For more information contact

the Extended Learning Services Office

at 279-5254

flyer 8/16/89

51 Mannakee Street, Rockville, Maryland 20850
(301) 279-5254

Montgomery College
Extended Learning Services

USE THIS FORMULA

TV + PC = MC

To Solve Your Spring Schedule Problems

Through the College of the Air Program

---+++---

- 12 different courses available.
- Courses broadcast on cable and PBS television stations.
- Electronic mail system available for class discussions and assignments (modems and communications software available through the ELS Office).
- Regular class attendance not required.

---+++---

See page 61 in the Schedule of Classes

or call 279-5254 for details

51 Mannakee Street, Rockville, Maryland 20850
(301) 279-5254

Montgomery College
Extended Learning Services

HEALTH AND HISTORY COURSES
NOW AVAILABLE
THROUGH YOUR PERSONAL COMPUTER AND MODEM

You can complete HE-100 Principles of Healthier Living, and HS-201 American History to 1865, this spring through an innovative computer conferencing system called PARTICIPATE, a sophisticated form of electronic mail.

These courses require attendance at an orientation session, extensive reading and writing assignments, and a final on-campus examination. Class discussions of the course materials will be conducted through personal computers, modems, and the PARTICIPATE software that runs on the College's academic mainframe computer.

To be eligible for these courses you must have access to an IBM compatible computer and telephone modem, and you should also have:

1. completed EN 101 or the equivalent
2. basic typing or word processing skills
3. completed at least 15 semester credit hours
4. a 2.5 or higher grade point average

Before registering for these courses (see the section numbers below), you must complete a special Computer Conferencing Student Information Form and talk to a Rockville Campus advisor. You might also wish to contact the course instructor for more detailed information about course assignments.

Section No.	Instructor	Orientation Time/Date/Location
HE 100-NM5	H. Pflueger	7:00 pm 1/25/89 CC 233
HS 201-PM3	K. Miller	7:00 pm 1/24/89 CC 233

(Note: Campus Center 233 is the Continuing Education Office conference room)

For more information
call the Extended Learning Services
phone number listed below

51 Mannakee Street, Rockville, Maryland 20850
(301) 279-5254

Montgomery College
Extended Learning Services

July 26, 1989

Dear High Technology Council Member:

Did you know that you can help your employees earn a college degree without interrupting their work schedule? By using the new Montgomery College electronic mail system, your personnel can

- complete some MC courses without having to attend classes.
- eliminate travel time, costs and, perhaps, child care expenses.
- communicate with faculty and other students 24 hours a day.

If they own or have access to an IBM compatible computer, your personnel can use the College's electronic mail system to complete Principles of Healthier Living and American History to 1865, two courses that can be applied to any degree program at the College. And they don't have to be a computer whiz to use the system. In fact, the College will even provide

- the software and a modem, if they need them, to access the system.
- the training and technical support to help them get started.

Please share this important information with those employees whom you think could benefit from this convenient learning opportunity.

For more information about the new Montgomery College electronic mail courses, call the Extended Learning Services Office at 279-5254.

Sincerely,

Tim Peterson

Tim Peterson, Dean
Extended Learning Services

TWP/bw

(2171c)

Montgomery College
Extended Learning Services

childcare center users

July 27, 1989

Dear MC Student:

If you're trying to earn a degree but have trouble getting to campus, wouldn't you like to

- complete some of your required courses without attending class?
- save time and money?
- talk to your instructors or other students any time day or night?

If you own or have access to an IBM compatible computer, you can now use the new electronic mail system at Montgomery College to

- reduce your childcare expenses.
- send and receive course assignments from home or work.
- eliminate travel time and costs.
- communicate with instructors and other students 24 hours a day.

You don't have to be a computer whiz to use this exciting new technology to complete HE 100 or HS 201, two courses that can be applied to all MC degree programs. In fact, the College will even provide you

- the software and a modem to access the e-mail system.
- the training and technical support to help you get started.

To find out more about this convenient new way to learn, call the Extended Learning Services Office at 279-5254.

Sincerely,

Tim Peterson, Dean
Extended Learning

51 Mannakee Street, Rockville, Maryland 20850
(301) 279-5254

Montgomery College

[illegible]
Community College

July 27, 1989

Director
Parents Without Partners
6326 Rockhurst Road
Bethesda, MD 20817

Dear Director:

This fall, Montgomery College will offer two courses that might be of particular interest to some of your members. Both courses will be offered through the College's new electronic mail system and have been designed to permit adult students to

- reduce childcare expenses.
- eliminate travel time and costs.
- complete some degree requirements at home or work.
- communicate with faculty and other students 24 hours a day.

If any of your members have access to an IBM-compatible personal computer and enjoy discussing health issues or would like to learn more about American history, these "e-mail" courses will be both stimulating and convenient for them. And they don't have to be computer experts to enroll. In fact, the College will even provide

- the software and a modem to access the system.
- training and technical support to help them get started.

Please share this exciting news with your members and encourage them to contact the Extended Learning Services Office at 279-5254 for more details and registration information. Thank you for your help.

Sincerely,

Tim Peterson

Tim Peterson, Dean
Extended Learning
Rockville Campus

Central Administration
[illegible]

Germantown Campus
[illegible]

Rockville Campus
[illegible]

Takoma Park Campus
[illegible]

Bethesda Center
[illegible]

Montgomery College
Extended Learning Services

January 9, 1990

Dear Telecourse Student:

Welcome to the College of the Air telecourse program. You probably already know that telecourses are a convenient alternative to taking on-campus courses. However, did you also know that you can use the new Extended Learning Services electronic mail/bulletin board system to communicate with your instructor and other telecourse students?

You can use the e-mail system to send and receive messages and assignments instantaneously anytime day or night. Each COA course is organized into a special "forum" on the system so that you can discuss course topics and questions with other students much like you would in a traditional lecture course held on-campus.

You can access the system through just about any personal computer as long as you have the appropriate communications software and a modem. We will loan you a modem and the software (for IBM or compatible PCs) if you need them or, if you don't have a computer but would like to try the electronic mail system, there is a PC in the Takoma Park Learning Lab that you can use on a first-come first-serve basis. If you plan to use the system to upload files (e.g., to send essays or long messages through the system), you will also need to have a word processing program capable of generating ASCII files (e.g., WordPerfect).

Although you don't have to use this new system to complete your telecourse, we think students will find it more fun and convenient than using the regular mail system. In fact, students in BA 101 and PY 102 will be part of a research project the College is conducting to see if the system can actually improve learning.

If you haven't already signed-up to use the system and want to learn more about it, call the ELS office at 279-5254 and we'll give you all the details!

Sincerely,

Patricia Ryan

Patricia Ryan
Administrative Associate
Extended Learning Services

PR/bw
(3528c)
cc: Ms. E. Hewitt
Dr. L. Miller

51 Mannakee Street, Rockville, Maryland 20850
(301) 279-5254

Montgomery College
Extended Learning Services

February 1, 1990

Dear COA Student:

By now you probably know that telecourses are a convenient alternative to taking on-campus courses. However, did you also know that:

- *Montgomery College has a new electronic mail/bulletin board system (BBS) for COA students;*
- *you can use this system to send and receive course assignments instantaneously via your personal computer;*
- *you can participate in "class discussions" with your course instructor and other students through the system;*
- *the College will loan you a modem and the communications software if you need it to access the system; and that*
- *you can use a personal computer in the Takoma Park Campus Learning Lab to access the system if you don't have your own personal computer (some employers have even allowed students to use their PCs at work as a "no cost" educational benefit).*

Although not all COA faculty are currently using the new system, you might still wish to experiment with it (e.g., to form a "study group" with other students or to learn more about telecommunications).

If you already have a modem and would like to "preview" the system, the computer phone numbers are 353-1912 and 1913. Set your communications software to 8 data bits, no parity and 1 stop bit. 1200 or 2400 baud rates are acceptable. The system is extremely "user-friendly" and if you leave a message for the system operator (Sysop) indicating which COA course you are taking, he'll authorize you to get into that course "forum."

For more information about the new e-mail system, call the Extended Learning Services Office at 279-5254.

Sincerely,

Patricia Ryan

Patricia Ryan
Administrative Associate

tele
cc: COA Faculty

51 Mannakee Street, Rockville, Maryland 20850
(301) 279-5254

Montgomery College
Extended Learning Services

February 7, 1990

Dear COA Student:

You know how convenient telecourses are, but did you also know that

- *Montgomery College has a new electronic mail/bulletin board system (BBS) for COA students;*
- *you can use this system to send and receive course assignments instantaneously via your personal computer and to participate in "class discussions" with other COA students;*
- *the College will loan you a modem and the communications software if you need it to access the system; and that*
- *you can use a personal computer in the Takoma Park Campus Learning Lab if you don't have one at home or at work.*

We think the new system is fun and easy to use, but we want to collect some data to see how effective it is compared to regular telecourses and lecture courses. Please complete the enclosed documents (two questionnaires and a course pretest) and return them in the postage-paid envelope regardless of whether or not you plan to use the e-mail system. This information will be kept ***completely confidential and will not affect your course grade in any way.***

We'd also like to encourage you to use the system. If you already have a modem and want to "preview" the system, the computer phone numbers are 353-1912 and 1913. Set your communications software to 8 data bits, no parity, 1 stop bit, and 1200 or 2400 baud. Leave a message for the system operator (Sysop) indicating which COA course you are taking, and he'll authorize you to get into that course "forum."

For more information about the new e-mail system, or if you have any questions about the enclosed documents, please call the Extended Learning Services Office at 279-5254. Thanks for your help and interest.

Sincerely,

Patricia Ryan
Administrative Associate

fipse

51 Mannakee Street, Rockville, Maryland 20850
(301) 279-5254

MONTGOMERY COLLEGE
Office of Extended Learning Services

February 12, 1990

MEMORANDUM

To: All COA Faculty

From: Tim Peterson, Dean of ELS TP

Subject: E-mail System & Faculty Development

As you know, our new e-mail/bulletin board system (BBS) for the COA program is up and running. Although only a few students have expressed interest in using the system thus far, I want to encourage you to take advantage of this valuable resource because I have good reason to believe that it can truly enhance telecourse learning and that many students will want to use it in the near future.

For example, no one registered for Karen Miller's HS 201 e-mail course a year ago when we first offered it. Last semester 13 students took the course. This semester Karen has 21 students. I think this may portend a pattern for COA student usage of the system.

Several COA faculty members have stressed the importance of student attendance at the course seminars. I concur that this is an important component of the COA program. However, I also believe that telecourses can be structured in a way that reinforces the value of, and provides more opportunities for, active student participation in the learning process. Further, I think we should do whatever we can to facilitate writing across the curriculum and to mitigate student attrition in the COA program.

I have tentatively scheduled a COA faculty workshop for Saturday, March 24, from 9:00 - 12:00 (location TBA) and have asked Karen Miller and Dr. Steve Steele, who teaches the *Focus on Society* course at Anne Arundel Community College, to discuss some of their teaching strategies for enhancing student learning in their respective e-mail and COA courses.

I would like to know by February 21 whether or not you will attend the workshop (lunch will be provided). And please arrange to pick-up your laptop computer to access the new e-mail system (or if you've already done so, please start using the system). Even if none of your students use the system this semester, you can still begin to learn it by communicating with the other COA faculty, Pat Ryan, Ben Acton and myself.

cc: Dr. Brown

MONTGOMERY COLLEGE
Office of Extended Learning Services

February 12, 1990

MEMORANDUM

To: College of the Air Faculty
Learning Lab Staff

From: Patricia N. Ryan, ELS Administrative Associate

Subject: E-Mail Demonstration

The Learning Lab at Takoma Park has a computer with an internal modem that the College of the Air students and faculty can use for their E-Mail classes. The computer is in Room 107 of the Resource Center Building. College of the Air faculty and students may sign out the telecommunications software (Procomm Plus) for the computer at the main desk in the Learning Center.

Please join us for a demonstration of the E-Mail system on Friday, February 23, at 2 p.m., in the Takoma Park Learning Lab.

I will demonstrate the use of the telecommunications package and the BBS (bulletin board system) that the College of the Air faculty and students are using. I will also provide copies of the step-by-step instructions for the use of the systems.

Muriel Blatt will explain the sign-out procedures for the telecommunications software at the demonstration.

Please let Bev Weidmann (279-5254) know by February 21 whether or not you will be able to attend the demonstration.

Thank you.

PNR/bw
(3880c)
DISTRIBUTION
Ms. Baluyut
Mr. Daniels
Dr. Flynn
Dr. Morgan
Ms. Matuskey
Dr. Miller
Mr. Nair
Mr. Scott
Dr. Sickels
Mr. Sterjevich
Dr. Wiley

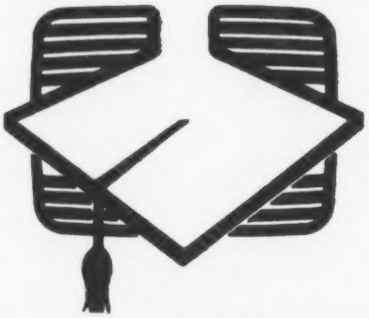
Ms. Blatt
Mr. Heiss
Mr. Markley

cc: Dr. McNeil
Mr. Peterson

BEST COPY AVAILABLE

EARN COLLEGE CREDIT AT HOME

Through Montgomery College of the Air Telecourses



Telecourses are a great way for busy people to accelerate the completion of a degree program when combined with weekend or evening courses.
Here's why:

Telecourses are Convenient

- Courses are aired on local PBS and cable television stations.
- Exams can be taken and videotapes viewed on all 3 campuses.
- Only three campus seminars required.

Telecourses are Interactive

- Campus seminars allow you to meet faculty and other students.
- Course instructors are available to help you by telephone.
- An optional e-mail system is available to all telecourse faculty and students.

Telecourses are Quality Courses

- All courses are developed by teams of academic experts.
- All courses are led by MC faculty.
- All courses meet MC general education requirements or can be used as elective credits.

Fall 1990 Telecourses

BA 101 Introduction to Business
TV Title: The Business File

BI 106 Oceanus: The Marine Environment

EC 201 Principles of Economics
TV Title: Economics USA

EN 101 Techniques of Reading and Writing I
TV Title: The Write Course

HS 151 History of Western Civilization
TV Title: The Western Tradition

HS 201 History of the U.S. to 1865
TV Title: The American Adventure

MG 101 Principles of Management
TV Title: The Business of Mgmt.

MG 121 Introduction to Marketing
TV Title: Marketing

PL 201 Introduction to Philosophy
TV Title: From Socrates to Sartre

PS 101 American Government
TV Title: Government by Consent

PY 102 General Psychology
TV Title: Discovering Psychology

SO 101 Introduction to Sociology
TV Title: Focus on Society

Courses begin the week of September 2, 1990
For information about Montgomery College Telecourses call 587-9216 or see the College of the Air section of the Fall 1990 Montgomery College Class Schedule

Earn College Credit at Home — Through Montgomery College Telecourses

This fall why not take advantage of the opportunity to study business, economics, English, history, management, psychology, sociology, and more — from the convenience of your home?

It's easy to do; all you have to do is discover the quality and convenience of Montgomery College of the Air telecourses.

Telecourses free you to learn.

- *all courses are aired on PBS or cable television — and you can even use your VCR to videotape the classes for later viewing!*
- *only three on-campus visits are required of you — you watch the rest of the course on television.*
- *successfully completed telecourses carry weight and will work toward helping you complete your college degree.*

Telecourses are interactive.

- *course instructors help you by telephone and work with you to meet your personal needs.*
- *three on-campus visits per semester familiarize you with faculty members and other students.*
- *all students are eligible to participate in an up-to-the-minute electronic mail/ bulletin board system (BBS) providing you with another convenient way to learn at home.*

Telecourses are quality courses.

- *Montgomery College faculty ensure the high quality of all courses.*
- *all courses are developed by teams of scholars who also ensure that the courses' standards meet your standards.*
- *telecourses meet Montgomery College general education requirements or can be used as elective credits; what could be more convenient?*

For additional information on telecourse opportunities at Montgomery College, call the College of the Air Office at 587-9216.

PROGRAM YOUR

POSSIBILITIES

MONTGOMERY COLLEGE · FALL 1989 · CLASS SCHEDULE

Earn College Credit at Home

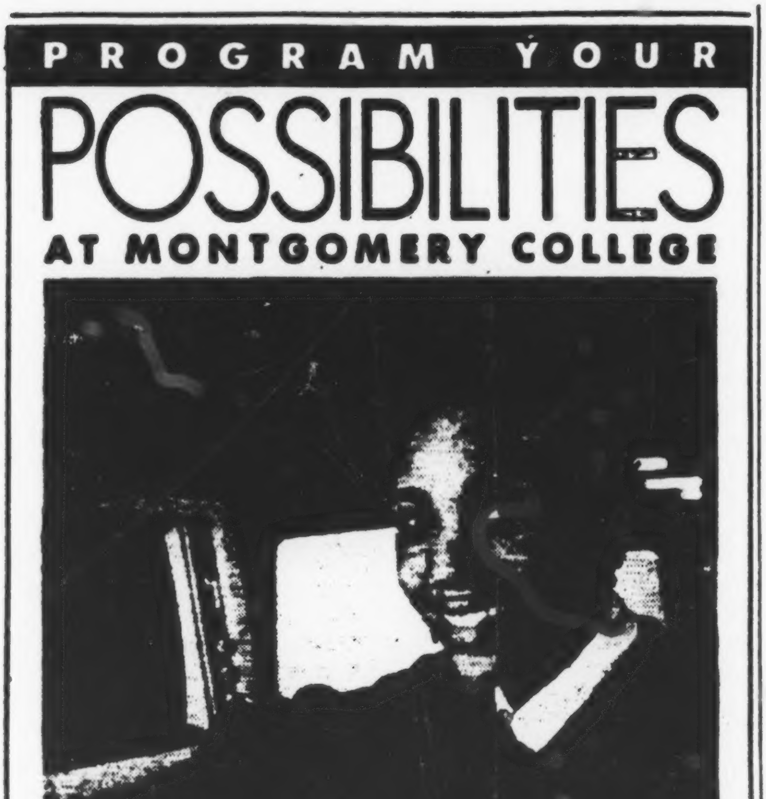
You can use your television or your personal computer to earn college credit at home through the Office of Extended Learning Services at Montgomery College.

The College of the Air offers nearly a dozen credit courses over local PBS and cable television stations. Students who miss a broadcast or who wish to review program videotapes may do so at the Germantown, Rockville or Takoma Park campuses. Midterms and final exams also may be taken at any campus. For information about College of the Air, call 587-9216.

Two courses—*Principles of Healthier Living* and *U.S. History to 1865*—will be offered this fall through computer conferencing, the College's new electronic mail system.

Class lectures and discussion will be conducted through computers and modems so no class attendance will be required other than an orientation session the first week of the semester. Students must have an IBM-compatible computer and telephone modem to enroll.

Computer conferencing students should have good writing skills, familiarity with personal computers and a high level of self-discipline to benefit from these courses. Both courses meet the College's General Education requirements. For information on computer conferencing courses, call 279-5254.



PROGRAM YOUR

POSSIBILITIES

AT MONTGOMERY COLLEGE

Use This Formula To
Solve Your Class Schedule Problems
TV + PC = MC

College of the Air Telecourses

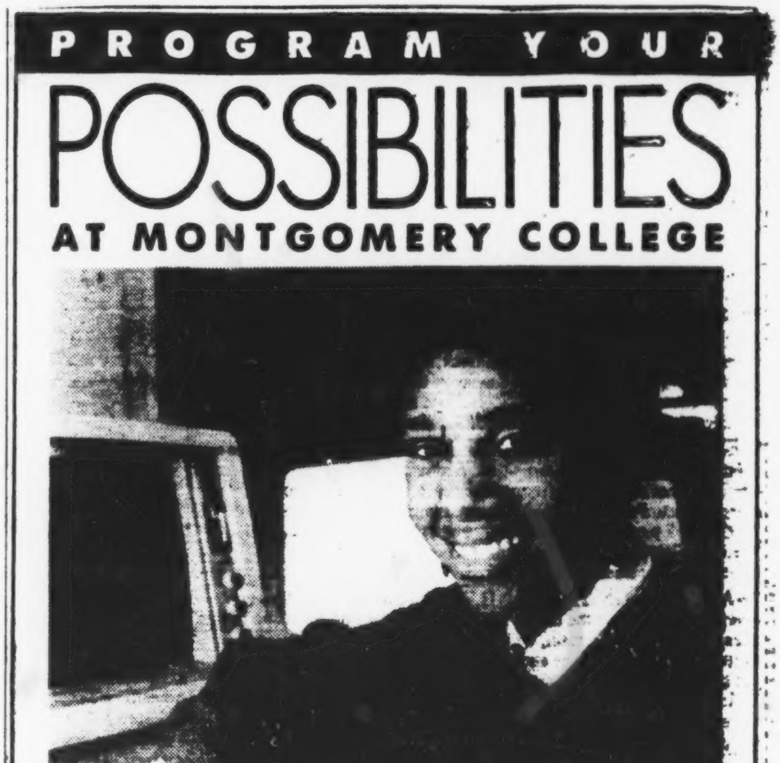
- Offer courses in business, economics, history, psychology, statistics and seven other subjects.
- Are broadcast on local cable and PBS television stations.
- Let you use your personal computer to communicate with other students and instructors through a new electronic mail system.
- Can save you time, child care and transportation expenses since regular class attendance is not required.

For more information, call 587-9216

Late registration ends January 24

Montgomery College
Campuses at Germantown, Rockville and Takoma Park, Maryland

Post 1/11/90



PROGRAM YOUR

POSSIBILITIES

AT MONTGOMERY COLLEGE

Earn College Credit at Home or in Your Office

Use your personal computer to take an electronic mail course in American history or health. The College will provide software, modems, training and technical support. No class attendance required. Both courses applicable to Montgomery College degree programs. For information, call 279-5254.

Montgomery College

Campuses at Germantown, Rockville and Takoma Park, Maryland

Washington Post, 8/10/89

Computer Conferencing

Location	Montgomery County, Maryland
Duration	1988 - 1991
Funding Agency	Fund for the Improvement of Postsecondary Education (FIPSE), Department of Education
Implementing Institution	Montgomery Community College
Objectives	Assess the impact of computer conferencing on the academic performance of students and faculty. Measure the cost-effectiveness of computer conferencing as an instructional tool.

In this project, AED will systematically compare college courses taught in the traditional lecture format with those taught by computer conferencing. One professor will teach the same course in three formats: (1) traditional lecture format, (2) computer conferencing alone with no face-to-face contact, and (3) computer conferencing supplemented with one lecture per week. Courses will be presented in business, history, health, and psychology.

Computer conferencing connects groups of people around topic and subject matter areas. Individuals join conferences of their own choosing and read and write messages at their own convenience. In an academic setting, both faculty and students work at their own pace and time. Communication is asynchronous, and faculty and students do not have to be at the same location or working at the same time.

In a class taught by means of computer conferencing, the professor organizes the initial conference; the professor is responsible for shaping and motivating student participation. Class members receive, read, write, and send messages to the conference. Together students submit notes, debate issues, clarify concepts, and ask questions in a collaborative network of shared information. The professor and the students explore and expand upon the print-based materials through interactive discussion and analysis.

Computer conferencing permits both public and private communication. All members can share in the material open to the entire conference. Students can also create subtopic branching conferences with smaller groups within the conference, and each student can communicate privately with the professor. All course assignments are transmitted electronically.

Besides comparing the academic performance of students in the three course formats, the project will evaluate the cost-effectiveness of computer conferencing as an instructional tool. The project will help AED assess how well computer conferencing can be integrated into different subject areas and how it affects faculty members in terms of their motivation, teaching styles, and use of time.

12/88

DOES INTEGRATING TECHNOLOGY POSE A PROBLEM TO YOUR INSTITUTION?
IF IT DOES, ASK YOURSELF THESE QUESTIONS:

What Should The Technologies Be Used For ?
– instruction, administration, research, counseling, library services, communication?

Who Should The Technologies Serve ?
– campus students, researchers, distance learners, faculty, administrators, counselors, staff?

What Technologies Should Be Used ?
– audio or video tapes, broadcast or slow-scan television, electronic blackboard, electronic mail, computer conferencing, videodisc?

What Structures Will Be Needed To Handle The New Technologies ?
– coordinators, a "tsar", decentralized decision-making, advisory committees?

What New Policies Will Be Needed To Manage The Technologies ?
– teaching loads, salary increases, promotion, copyright, security?

What Training Programs Will Be Required ?
– using technologies, changing the pedagogy? Will training be centralized or decentralized?

What Involvement Will Faculty, Administration And Students Have ?
– in hardware and software purchases, in training programs, in using different technologies?

Who Will Set The Priorities ?
– for which technologies, for which disciplines, for which purchases?

What Will Be The Costs ?
– in dollars, time, and energy? Will resources be diverted or new money needed?

The Academy for Educational Development Can Help!

AED has the expertise to help you find solutions to technology problems. AED can:

- **Conduct a technology needs study**
- **Analyze the structure and policies of the institutiton or agency**
- **Prepare a training and support plan**
- **Recommend modifications in structure, policies, operations**
- **Recommend a time schedule for implementing technology**
- **Provide several options with estimated costs of each**
- **Aid in the writing of proposals for funds**

If you are interested, please contact:

Dr. Donald R. McNeil
Academy for Educational Development
1255 23rd St. NW
Washington, D.C. 20037
Phone: (202) 833-7613 Fax: (202) 467-8755

MC to offer two classroom courses via computer

By KATHRYN BURNS
Sentinel Staff Writer

In the 1960s, computers came to the classroom. In the 1980s, the classroom is coming to the computer. At least it is at Montgomery College.

Administrators are aiming the program, which began during the spring semester and is being continued this fall, at students with time constraints, small children or other obstacles to spending extra hours on campus.

Two such courses will be offered, according to Timothy W. Peterson, instructional dean for extended learning services — "Principles of Healthier Living" and "U.S. History to 1865," both of which were offered last spring.

Those two courses were chosen because they both can be applied toward basic graduation requirements, he said.

But the classes are also part of what Peterson calls a "quasi research" project, partially funded by a grant from the U.S. Department of Education.

He uses the term "quasi-research" because it will not be possible to randomly assign students to groups for study, and because those taking the classes via computer may have certain characteristics that differ from other students, such as income or age.

The results could have ramifications not just for Montgomery College, but other schools as well.

"What we're attempting to do, in addition to just providing a convenient alternative to going to class, is to look at two things," Peterson said.

"Is this as instructionally effective as a lecture course? And is it as cost-effective as a lecture course, both from the student's perspective and from the institutional perspective?"

One faculty member from each of the two courses will participate, teaching one class in the experimental computerized format while staying with the traditional lecture format in other classes, Peterson said.

The same material will be covered and the same textbooks used. Students will be surveyed on a strictly confidential basis about matters such as their ages, study habits and incomes, Peterson said.

Child care costs and commuting times will also be among the data analyzed.

Prince George's Community College and Northern Virginia Community College will join the project during the spring semester, Peterson said.

The project is also seen as a way to maximize the college's computer resources. The programs for the courses run on the college's mainframe computer, Peterson said, which rarely has been used in recent years except for courses in Cobol, Fortran and other computer languages; faculty members now often prefer to use their own microcomputers instead.

Students enrolling in the computerized classes will need to have access to an IBM-compatible personal computer, Peterson said.

If they don't have a modem or the telecommunications software, the college will provide them. The students will attend one orientation session and take one final exam on campus — unless the teacher opts to give a take-home final instead.

The course will operate by "electronic mail," Peterson said, with students checking a "mailbox" on the screen at any time, day or night, to see if they received any messages and whether messages they sent have received a response.

Instructors will make reading assignments and provide lists of weekly questions which the students are expected to answer. Teachers will check for messages daily and should ideally respond to student messages within 48 hours, Peterson said, making for quicker feedback on homework than in some conventional classes.

"I think what students will find is that they get more individual attention from the instructor," he said. "The instructor also will know who's been on line and discussing the material."

Students may also correspond with each other, he said, and arrange meetings and projects face to face if they wish.

Professor Hazel Pflueger taught the computerized health course via computer last spring and is slated to do so again this semester.

The spring class had four students — possibly because of a lack of publicity, particularly about the available modems and software, according to Peterson — and at this writing approximately six have signed up for fall, Plueger said.

She echoed Peterson's assessment of the computer class' advantages.

"I did find that those who took the computer class did seem a little bit closer to me," Pflueger said.

The students would initiate their own topics through the mail as well as discuss hers, she said.

Pflueger said enrollees in the computer class tended to be in their late 20s or 30s, a little older than what people tend to think of as the average college student.

They also needed to be fairly independent in order to make the process work for them.

The computer classes do lack the spontaneity of regular lecture meetings, Peterson said.

And there were a few technical glitches at first, because of inexperience with the project.

This semester, Peterson said, students with computer problems will be able to call day or night on a professor, Ben Acton, who is assigned to assist with such crises.

But even with the occasional computer snafu, Pflueger said there were obvious advantages to the new high-tech method of learning.

"Certainly it's a time saver for individuals who work, or who have a reason for being shut in at home," she said.

Sentinel Staff Photo by Greg [illegible]

Computerized classes are a convenient alternative to going to class, says Timothy W. Peterson.

Peterson said although there have been a few institutions that offered courses using electronic bulletin boards, he knows of none using a mainframe system like Montgomery does.

The mainframe means a much larger memory for students to utilize and more phone lines, lessening the chances of getting a busy signal when dialing.

Class registration ends Thursday, Aug. 31, Peterson said. Students interested in adding one of the computer courses after that date should contact the Office of Extended Learning Services at 279-5254.

Orientation will take place Sept. 9.

Attend College by Electronic Mail

by Tim Peterson

Personal computers and telecommunications are rapidly increasing access to new services and information. Now you can take academic courses from your home or office through Montgomery College's new computer conferencing system, a sophisticated electronic mail program that runs on the school's academic mainframe computer. Principles of Healthier Living, a one-credit-hour wellness course, and History of the U.S. to 1865, a three-credit-hour course, will be offered during the fall semester. Both courses partially fulfill the college's general education requirements for an Associate of Arts degree.

To access the system, you must have an IBM-compatible personal computer and a modem. The college will provide the software and even loan you a modem. You dial up the school's mainframe computer and log on to communicate with the course instructor and other students. Class discussions are conducted and assignments may be completed through the system at all hours of the day and night. Consequently, there are no class meetings to attend, other than an orientation session at the beginning of the course and a final exam at the end of the semester.

You don't have to be a computer expert to learn how to use the system. However, you should be somewhat familiar with personal computers. Working adults, single parents, the disabled, and anyone else who has trouble attending classes on campus will find computer conferencing courses extremely convenient.

For more information about Montgomery College computer conferencing courses, call the Extended Learning Services Office at (301) 279-5254.

Tim Peterson is Dean of Extended Learning at Montgomery College in Rockville, MD. He may be reached at (301) 279-5254.

WED: A Shareware Text Editor

reviewed by Philip Karras

I use a text editor for programming as well as for word processing. In this regard, I am a common animal; I find that most people who program do the same. Those who use only programs such as word processors, spreadsheets, databases, and so on tend to ignore text editors. It is my opinion that fully 90 percent of all users should have a good text editor. The other 10 percent have no inclination to change their computer system.

A text editor can be used to write a BATCH file you need, or the CONFIG.SYS file, or even write the few lines of cookbook code to make a COM file. (This is a common *PC Magazine* practice.) What, then, constitutes a "good" text editor?

A good editor should come with standard features:

- Insert/overwrite mode ability
- Delete/Undelete
- Minimum capability of working on two files at once
- Ease of transfer of text from one file to another
- Ease of use

As a quick statement of fact, WED now has all of the above features. It also has context-sensitive on-line help, as well. This feature alone makes the program easy to use. If you are in the market for a text editor, I recommend that you try WED and see if it fits your requirements. This review was written using WED.

When I started using the first version of WED, I had a few problems. I am not going to dwell on them; I spoke with WED author Mason Washington, and he assured me that the problems would be fixed by the time I had to turn in this review. Washington was as good as his word. Not only did he fix the problems, he also instituted some of my suggestions.

WED is a full screen editor. This means that WED uses the entire screen for your work, and if you need help from anywhere in the program you can get it. The help will be either about the operation at hand or everything—your choice. I was able to use the program solely from the help screens.

You can use the Setup section of the program (Alt-S) to change the defaults; for example: the type of cursor, the type of carriage return-line feed marker, and the type of insert mode the 0-Ins key uses.

The insert mode may [illegible] clarification because WED comes with two of them:

1. The "normal" mode: Insert a character at the present location of the cursor and push everything behind it back one space.

2. The "drop down" mode: Separate the file, drop down a few lines, and insert at present location of cursor. WED opens blank space, from the position of the cursor to the right and then down

Members in the News

Governor William Donald Schaefer presented Biotech Research Labs, Inc. with The Maryland Award for Economic Excellence, the State's most prestigious award. presenting the award, Schaefer said, "Companies lected for this honor demonstrate a commitment to quality and civic responsibility that sets a great example r all Maryland firms"—James H. Burrows, director of the tional Computer Systems Laboratory at NIST was honored by President Bush as a winner of the 1989 Presidential Rank Awards. The awards recognize cellence in the federal government Senior Executive Service and are given annually to federal managers for exceptional performance —Dr. Martha Church, president of od College will chair Campus Compacts Campus rtners in Learning project. The focus of this project is mentoring, crucial in helping at-risk students succeed at e early levels of education so that they may succeed as ults in being productive members of our work force and society —Booz, Allen & Hamilton opened its new training nter in November. The center will house classrooms, s, conference facilities and satellite downlinks for vised technical instructions. Booz, Allen currently offers 216 engineering, technical and business courses, as well tuition assistance to its employees —Dr. Howard Eisner, 0 year veteran of Atlantic Research Corporation's ARC Professional Services Group has left to become a Distinguished Research Professor and Professor of gineering Administration in the School of Engineering and Applied Science at the George Washington University —Another Atlantic Research executive, Edward T. Jones, s honored for his work on behalf of the Armed Forces mmunications and Electronics Association. Jones is a st member of the Board of Directors of the Washington apter —COMSAT (Communications Satellite rporation) has formed an educational alliance with Jefferson Junior High School in S.W. Washington D.C. COMSAT will donate a total of $1.1 million over the next five years to better equip the school to excel in math and science disciplines.

Skip Gunther, VP and Dir. of Administration (left); William Stasior (center) and Gary Mather, presidents of Booz, Allen, at beginning of construction of new training facility.

MC Links Students and Courses via Electronic Mail System

For 15 years, Montgomery College of the Air telecourses have enabled working adults to earn college credit without attending classes on campus. This January, the College will enhance its telecourse program by encouraging more than 400 students in a dozen different courses to use its new Extended Learning Services electronic mail system. Students in business, economics, management, marketing, statistics and seven other courses will be able to send and receive course assignments instantaneously and to communicate with other students and instructors at any time (day or night) by using the new system. Although students must have access to a personal computer to use the system, the College will loan modems and communications software to those who need them.

In addition to using the E-mail system, telecourse students watch video programs on local cable and PBS stations or in designated areas on any of the College's three campuses. They also attend three course seminars, complete assigned readings, and take a mid-term and final examination. According to Tim Peterson, Dean of Extended Learning, many students will probably opt to use the new system even though it is not a requirement for taking a telecourse. In fact, several students who took an experimental E-mail course this fall persuaded their employers to let them use their computers at work during lunch or after working hours as a "no cost" education benefit.

For information about College of the Air courses and the new E-Mail System, call the ELS Office at 279-5254.

CATALYST

ATALYST is published bimonthly for the high hnology community by the Montgomery County h Technology Council, Inc.
Chairman: Harvey D. Kushner
Vice Chairman: Donald R. Johnson
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President: Walter H. Plosila
ALYST Editor: Kathy Manning. Production Editor the December issue was Linda Fernald of Atlantic Research Corporation, ARC Professional Services oup. We express our thanks to her and ARC for ting the December issue. Deadline for the ruary issue is January 10th.

Vol. 3 No. 6. Dec. '89

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WETA Mag.
August 1990

A New Season of Telecourses

by John F. Ross

Learning at Home

Get credit for watching television? Sounds crazy . . . but, it's the way of the future for adults who want to go back to school but don't have the time to commute.

"Many people don't realize how big telecourses have become in this country," says William Philipp, Director of Adult Learning Services at PBS. "One-and-a half-million students have taken a telecourse since 1981. And the quality of these courses is equal to those on campus—they just have a different method of delivery."

Telecourses at three local colleges—Northern Virginia Community College (NOVA), Montgomery College, and Prince Georges County Community College—could be the answer if you're searching for a little extra-ordinary stimulation—or as credit toward that degree you've wanted.

Says Stephanie Dailey, WETA's Director of Educational Activities, who licenses programs to the local colleges, "This fall one of our programs is *French in Action*." It's a romantic comedy—you basically follow this funny soap opera and learn French while you're watching."

Each semester, WETA licenses five courses to the three local colleges for their telecourse programs. "I like to think of it as a triangular system," continues Dailey, "between the television station, the colleges and the home."

Another course this fall centers around 14 programs of *Joseph Campbell: Transformations of Myth Through Time*." Not a repeat of the Bill Moyers' Series, these programs trace mythology's role in human history and in our own lives through Campbell's inspiring lectures and seminars. "These shows are put together by the country's top producers and academics," says William Phillip, Jr. "This is good television, no chalk and talk. It's prime time material that many people will watch anyway."

But if you think that telecourses are just a matter of watching a little tube—maybe a little good public television—think again.

"Taking a telecourse," comments Mary Helen Spear, a professor who teaches psychology at Prince George's Community College, "is a lot more than watching television. Students need to be highly motivated—there's text and study guides to read, journals to keep, exams to take." This fall, she'll be teaching a course on human development

PROGRAM NOTES

WETA Telecourses, Fall 1990 air **Monday through Friday** from **12:30** to **1:30 p.m., beginning September 17.**

Monday: *French in Action* (no credit)

Tuesday: *Economics U.S.A.* (PG, MC, NOVA)

Wednesday: *Western Traditions, Part I* (PG, MC, NOVA)

Thursday: *The Write Course* (PG, MC)

Friday: *Joseph Campbell: Transformations of Myth Through Time* (NOVA)

Prime Time Telecourse: *Seasons of Life* that centers around a five part series entitled *Seasons of Life*, narrated by David Hartman. You can bet there will be a good deal of reading to go along with the programs.

And the caliber of the students, since they tend to be older, can be quite high. Leon Sterdjevich, a professor who's been teaching an introduction to business telecourse for the past seven years at Prince George's Community College, is pleased with the students. "In fact", he comments, "the students are about 30 percent better prepared, more capable and more successful than those enrolled in courses on campus."

Each of his courses includes three seminars and two exams held at the school. And he has office hours each day for a hour so that students can call in. "Many of my telecourse students are in their 30s or older, they've had a great deal of experience and they're eager to learn material that will help them succeed in their careers," he adds. "Thus, the quality of the questions and discussion is quite-high."

Who are the students that take these courses? They tend to be older, 70 percent are between the ages of 23 and 49. A whopping 90 percent of them work, either part or full-time. More than half have family responsibilities.

"We see quite a few mothers with children," comments Estelle Hewitt, who coordinates Montgomery College's telecourse program. For one, telecourses can save baby sitting fees, she points out. "But most importantly, homemakers can use telecourses as an entrée into academics, to keep their foot in the door when they're too busy with children."

Other students include people with shift work, whose job schedules vary so much that they can't attend weekly classes at the same day and hour. Telecourses give them the flexibility they need. Or people with one and a half jobs. Or students with heavy course loads.

"One fellow who has enrolled in our telecourses is in jail," says Randal Lempke, Director of NOVA's Extended Learning Institute. Another student in the program is a dentist who has taken every philosophy course offered—not for the degree, but for his continuing education.

"We appeal," continues Lempke, "to the incapacitated, to the incarcerated, to the gridlocked." Indeed, Elizabeth Potts of Silver Spring couldn't work toward a degree if she had to drive to class. "I'm 66," she says, "too old to keep driving in bad traffic." She's taken a single course every semester for five years. And she's so enjoyed the programs in American history, economics, sociology, management, business, computer and others that she's a member of the honor society.

Two-hour commutes to the campus and back three times a week is just not possible for many individuals who juggle work and family. Delete that commute and a course can become possible. "The VCR has made telecourses possible for many people," says Mary Helen Spear at Prince George's Community College. "Those who miss the class can tape the program and watch it at their convenience."

"Ever since the Industrial Revolution in this country," says WETA's Stephanie Dailey, "we've struggled out of our homes. Today, we're heading back to the home, assisted by technological tools that enable us to do at home what we do outside." Telecourses are a part of this larger picture in a world where the pace keeps increasing. "This movement gives the individual the highest degree of flexibility and freedom possible."

In fact, technology may provide answers to the biggest criticism of distance learning: lack of student-teacher and student-student interaction. Montgomery College, under the guidance of Tim Peterson, is embarking on an unusual program.

"For interested students with computers," Peterson says, "we can create an 'electronic learning community' by providing them with modem and software." This equipment enable students at home to communicate with other students and professors through an electronic-mail system. The system includes a series of 'forums,' for each specific telecourse: a student forum, professor forum, help forum and a systems library. Easy to use, learn, and compatible with most personal computers, the system enable students to pass messages or make notes about topics of discussion. Articles can also be accessed from the e-mail system.

"If you delete the times notations," continues Peterson, "the conversations in e-mail look just like the transcripts of a live course." And this e-mail has the advantage of fast sending and receiving—something that provides much faster turn-around than the mail.

"I like the idea," muses Peterson, "that a professor could require a certain discussion to take place by Friday, for instance. Students access the e-mail system whenever they want, make comments and respond to other students' comments. By the end of the week, the professor hooks in and has a transcript of the discussion that took place." To make the process easy for faculty, Montgomery Community College has provided them with portable computers, printers, and communications software.

The future can only get better. Montgomery Community College intends to add facsimile machines to their system. Later, they plan telecourse seminars that feature two-way, interactive video links.

With such technological breakthroughs and the growing popularity of telecoursing in our ever-busying lives—some 20 to 30 percent increase in enrollment and number of offering colleges each year—the long term future of telecoursing looks bright indeed. And that means good things for public television.

"Telecoursing serves the highest mission of public television," says Will Philipp, "to reach out into the community, educate and inform." Maybe the next time you turn on Channel 26, you'll be watching a program not only to learn something, but to earn a little credit . . . ▲

John F. Ross is a Washington freelance writer.

Appendix III--External Dissemination

Computer Conferencing and Home Study

by Donald R. McNeil

(Editor's Note: Mr. Donald R. McNeil is the Senior Program Officer for the Academy for Educational Development in Washington, D.C.)

Home study schools like to offer several learning options. Students -- especially adult students -- like multiple option choices, too. The computer has become the ideal source of two more powerful options for those learning at a distance: computer conferencing and electronic mail.

Both sound more difficult than they are. Both tend to scare the uninitiated. But both also are very effective.

One hitch, of course, is that teachers and students need access to a computer, a modem, and communications software. Up front costs can be relatively high. But the payoff is not only in more enrolled students, but in the increased satisfaction of the learners. Both options eliminate some of the barriers posed by jobs, families, time, or distance.

Here's how the electronic systems work. First, let's take computer conferencing which is best suited to distance learning and is extremely user friendly.

Let's suppose you are the faculty member teaching the course. You and each student are assigned individual accounts on the conferencing system. You dial a special telephone number, type in the proper identification, and then you type in the password assigned to you, and bingo, you are on the system, ready to read and write messages.

From a menu, you choose simple commands, such as how to read, write and send messages. All messages go into a data base and are dated and timed for easy retrieval.

Computer conferencing is just what it says. You hold an electronic conference (or topic, as it is often called), and all the members you choose to belong to that conference will automatically receive all the messages sent to the members. It is also possible to write a personal note to any one individual so that if a teacher wishes to admonish, or a student wishes to protest, it can be done in privacy without the others receiving the message.

The initial conference is organized by the teacher who shapes and motivates student participation. Conference members receive, write, and send messages to the conference, which, in turn, can be read and reviewed by all. Together, students and the teacher submit notes, debate issues, clarify concepts and ask questions in a collaborative network of shared information. The teacher and students explore and expand upon the printed-based program learning materials.

Overcoming distance barriers and providing rapid responses are the most powerful advantages for computer conferencing. Let us suppose you as the teacher, living in Spokane, have students in Tallahassee, Santa Fe, Fresno, Detroit and the Bronx (or merely scattered around a particular city or region). You write a message to the class and type the "send" command; the message goes into the conferencing circuitry and rests in the "mailboxes" of all people in that particular conference. The student in Tallahassee checks her mailbox that afternoon; the one from Santa Fe, four hours later; the student in Fresno is on vacation and reads the message a week later when he returns. As each student receives the teacher's message, he or she can reply immediately or wait until a later, more convenient time. When the student does reply, the message, if so desired, goes to all members of the class.

All communications are private within the conference group and are what computer technicians call "asynchronous." In other words, an instructor who likes to work from home at midnight, typing information into the system after the children are in bed, may do so. Students may prefer to study afternoons or evenings from their homes or from their job locations where they may have access to a computer.

Furthermore, it is particularly valuable for one-on-one discussions, too, (individualized instruction) when the teacher and learner can exchange private messages at their convenience.

Our experience with computer conferencing indicates that: (1) students are more satisfied working at their own pace; (2) they love the quick feedback; (3) they improve their writing skills as they frame questions and responses; and, (4) they become more intimately involved in the learning process because the responses are so much faster, and because they effectively simulate the real "give and take" of a traditional classroom.

Electronic mail is not as user friendly and messages are significantly harder to retrieve. Also, one must relabel every message or else keep the address list exactly the same. Because computer conferencing is based on messages being grouped by specific topics and each topic is restricted to a limited number of people, messages are a lot easier to find.

As for costs, it is the initial expenses that restrain many schools from using electronic communications for teaching. You need a personal computer, a modem, (a device which transmits the message over telephone lines), and communication software (which tells the computer how to send the messages). A small printer is advisable. The smallest personal computer costs about $800, a modem costs about $75, communications software $25, and a printer $150. So for under a thousand dollars one can have the basis equipment. Recent advances have enabled some firms to offer laptop computers with built in modems and communications software for under $600.

If all your students are in the same area, everyone will dial a local number for access. If your students need to call long distance to reach the teacher, then there will be additional telephone line charges.

There are several ways in which telephone line charges can be handled. One, each student can pay the long distance charges of their communications with the class. Two, the school can contract with a company that operates a computer conferencing system and pay them on an hourly basis -- about $7 per hour in non-prime time (6 p.m. to 6 a.m.) and $28 per hour in prime time. These estimated charges are usually built into the tuition of the course.

In recent years, these phone line costs have diminished rapidly because of the computer's ability to "upload" and time to type out the message or to read it while on-line. In others words, if messages are composed on the computer's word processor and "uploaded" into the computer conferencing mailboxes, only a couple of minutes of telephone time line charges are used. The same happens when the inbox of all the messages received are "downloaded" to a local computer where there students read them at leisure "off line."

Some institutions have bought their own system software and operate it themselves. For example, a school large enough to have its own mainframe or minicomputer, can afford to purchase the conferencing software to run all their own conferencing and electronic mail workloads themselves and contract with a private switching company to provide the phone lines at a reduced cost.

Besides providing an option for instruction, computer conferencing also makes it very easy to communicate with students, other faculty and administrative staffs -- especially at a distance -- on counseling, financial aid programs, and regular administrative matters.

Several institutions have begun using computer conferencing because it is so easy to use and provides such quick interaction. But they have found that their student enrollment marketing strategies have to change. Traditional student recruitment techniques are not effective. The market is where there are people who either own or have access to a computer in the work place or at home and who are willing to pay a little extra to obtain a modem and software and cannot or will not be in a position to attend classes.

With home study operations, you already have achieved the significant advantage of having segmented the self-study market. With computers increasingly being used everywhere and entire generations of students now growing up with computers, schools and colleges will have to meet this demand. Home study schools are in an excellent position to utilize this new technology in a way few other schools can.

FROM: National Home Study Council News, Fall, 1989

Point of View *By Donald R. McNeil*

Technology Is a Hot Topic, But Its Impact on Higher Education Has Been Minimal

THE USE OF TECHNOLOGY by colleges and universities is a hot topic. Technology can raise the quality of instruction and facilitate research. It can furnish access to remote data bases, enhance counseling and evaluation, and enable faculty members and students to work asynchronously at the time and place most convenient to them.

Telephone networks, videocassette recorders, and audio-tape machines now supplement traditional teaching methods at many colleges. Some institutions are installing short-range microwave systems, testing videodisks and electronic "blackboards," offering telecourses, and developing computer networks. The personal computer has made the greatest impact of all and is beginning to pervade all segments of higher education. College journals and newspapers are filled with stories about computers, and conferences on educational technology proliferate.

It sometimes sounds as if all of higher education is moving rapidly toward integrated, technology-based operations.

Why then is the actual impact on higher education so minimal? Why do so few of the 12.5 million students and 400,000 faculty members in American colleges and universities actually use the technology available to them?

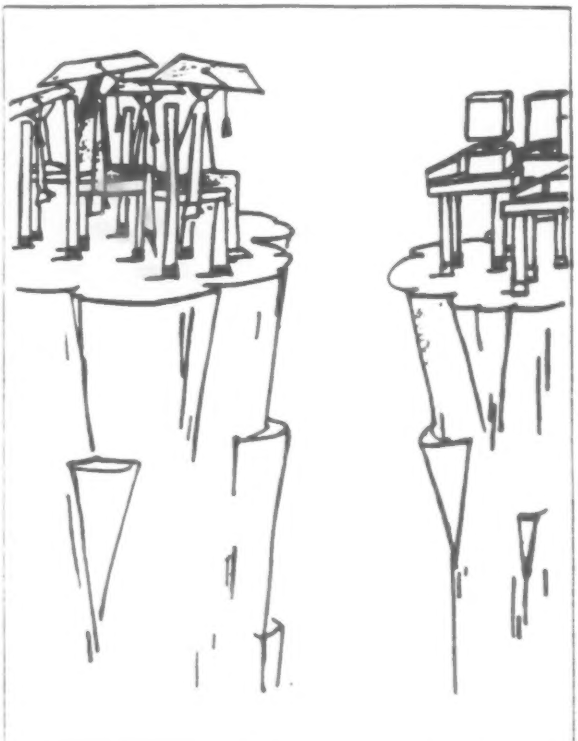
Although experiments with technology are under way, on the whole they remain just that—experiments. The vast majority of faculty members and administrators simply have no sense of the implications or the possibilities of using technology to teach, counsel, and administer. They either ignore technology or stubbornly resist it.

There are several reasons for this. Change comes slowly at universities. Faculty members in most disciplines have little experience with technology, and their institutions frequently do not provide incentives for them to use it or assist those who do become involved.

Programs developed elsewhere and delivered by technology are often regarded as invasions of home turf. Fear of the machines, of loss of employment, or of becoming the helper rather than the teacher contributes to faculty attitudes ranging from lack of interest to hostility. Cost, too, becomes a factor, as hardware, software, training, and technical support make demands on existing resources. But the most significant consideration may be that the interactive computer, combined with other media, often changes the pedagogy and the delivery system for teaching.

For example, a professor using video with an interactive computer program will have less personal contact with students, yet will deal more directly with each one. The use of data, pictures, and text can affect the sequence of the material presented, the time and place of learning, and how each student is stimulated to learn.

If technology is to be used more effectively in the future, each institution must consider some fundamental issues and questions before it decides if, when, and to what degree it will incorporate technology into its instructional and counseling operations. For example:



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- The institution must decide what the technology will be used for. Is the instruction that uses technology meant to supplement and enrich existing instruction, or is it to improve access to new audiences through a completely different delivery system? Is it to reach distant learners, or is it to improve the quality of on-campus instruction? Too often, such basic objectives are not defined. (Also, too often, technology addicts are people with a solution searching for a problem. It should be just the other way around.)
- Administrators must decide which technology is best for which students, which courses, and which objectives. The problem should be stated first; then the appropriate technology to solve it can be employed. Questions of effectiveness, cost, relevance, potential, and compatible environment can then be measured against each technological service to be rendered.
- Teaching must be adjusted. One cannot "lecture" on a computer; the students would be bored. One has to use a seminar approach, evoking questions, discussion, and debate. One must be able to involve students in the learning process in new ways. The faculty member's role will change from that of a lecturing authority figure to that of a facilitator of an exchange of ideas.
- Technology must be used to make teaching interactive. Self-contained audio and visual programs are passive. Two-way audio, the videodisk, and electronic-mail and computer-conference programs offer the advantage of being more interactive than traditional courses taught from the lectern.
- Since training is the key to technological success, faculty members must learn how to integrate the demands of technology with the subject matter of their courses. They will also need help in (or additional time for) modifying their courses to provide more involvement and discussion by students than straight lectures afford.
- The support system must change. Technical experts will be needed to keep computer hardware and software functioning and to mount special programs. Faculty members, for their part, must be more readily available for consultation and advice than ever before.

TECHNOLOGY has the capacity to do more than aid the exchange of information and ideas. It can enhance students' powers of analysis, sharpen their capacity to think critically, improve their writing skills, and increase their ability to develop independent judgments. If used properly, it is likely to alter the learning environment to such an extent that the old institutional models of campuses, classes, lectures, schedules, timetables, and tests will not survive in their present forms. How, when, what, and where we teach will change. For example, in some courses, a professor may meet classes only once a week or once every two weeks, teaching the rest of the time from a computer at home. The student may learn via a computer, a V.C.R., or a videodisk at home or in a dormitory.

We have not even come close yet to making a difference in the lives and learning experiences of most Americans. Millions of people have not and will not touch a computer. Thousands of corporations have not incorporated technology in their training programs.

Despite all the experiments and well-intentioned efforts, technology in higher education by and large remains in the hands of technical specialists. Few institutions have made concerted attempts to look at all the possible technological needs of *all* their faculty members and students. The resulting piecemeal choices are often expensive, duplicative, and ineffective. Well-planned programs incorporating the most appropriate technology produce exactly the opposite results.

I'm confident, though, that pressure from the increasing number of high-school graduates who have been exposed to computers and television throughout their lives, coupled with the immense technological demands of the business world, eventually will force higher education to adopt a less-resistant approach to technology. It may remain for the next generation to bring us up to speed.

Donald R. McNeil is a senior program officer at the Academy for Educational Development.

Delivering Credit Courses by Computer

And Other Observations

by

Donald R. McNeil
Academy for Educational Development
Washington, D.C.

Delivered at

Ohio State University

June 13, 1991

Three or four years ago I stepped into a taxicab here at the Columbus, Ohio airport and was amused to see a whole panoply of technological devices mounted under the dashboard. There was the usual radio voice squawking out orders to drivers around the city, and a radar detector for protective purposes. There was a cellular phone and along side it a television screen connected to a small computer. The driver could punch in questions to find out the fastest and easiest route from one place to another, what the costs would be, and how much gas would be used to reach the destination. If bored, he could switch it to television.

I marveled at this magnificent array of gadgetry and for several months afterward told the story as if this, plus my experiences, heralded a new age of technology, as if this symbolized the all pervasive penetration of technology everywhere in our society.

I should have known better. I had spent six years as head of University of Wisconsin Extension, with its radio and television divisions, its Articulated Instructional Media (AIM) Program and a Kenya radio-study Project. I had spent four years managing a consortium called the University of Mid-America (UMA) which was designed to take video courses to colleges and universities throughout the country. Out of that UMA experience had grown the idea of an American Open University with computer conferencing as the centerpiece for enabling students at a distance to obtain a baccalaureate degree. We initiated the program at New York Institute of Technology.

More recently, with financing from the Fund for the Improvement of Postsecondary Education, we have been conducting an experiment at Montgomery Community College in Rockville, Maryland in which we are comparing academic outcomes, levels of satisfaction and cost effectiveness of using computer conferencing and E-Mail as a means of totally replacing the classroom and as a supplement for video courses offered by the College.

In short, for the last 25 years or so I have been involved in the APPLICATION of technologies in educational settings, and whatever lessons I thought I could draw from those experiences and that cab ride in Columbus, I was far too impulsive about my conclusions. Or maybe it was naivete. The world was not moving as fast toward the proper application of technologies as I once thought.

I pause here to offer a few general comments about what I believe is the present state of technology. The computer is rapidly being wedded to voice and video. The videodisc, the compact disc, graphics, easier-to-use software all will help create a learning environment in the future that will be vastly different than what we know. And computer conferencing should be looked at in light of that whole new and rapidly changing technological environment.

In a sense technology IS almost everywhere. But widespread use is not. Nor do we know very much about the outcomes of these prodigious efforts to introduce technologies into every phase of our lives.

This is particularly true of education whether it be at the elementary and secondary or college and university levels, or whether it be training programs for industry, labor or government.

It is true that more and more people are becoming involved with the computer as a tool in the learning process, but the computer's penetration of the work force and the schools and colleges is still shallow. A number of notable experiments are under way and they are to be lauded. And while we have a long way to go to gain universal acceptance and usage we are definitely moving ahead.

However, it still seems to be a provider-oriented market, that the "magic answer" mentality of hardware and software vendors is matched only by the "gee whiz" attitude of some administrators, purchasing agents, computer center personnel, legislators, faculty and students.

More attention to assessment of the consumers' needs -- both faculty members and students -- is in order. Is this the right method for this course? Which of the several technologies will work best. Do we need in every case such sophisticated software? what are the rewards for faculty members who participate? Will there be resources sufficient to make it a quality course?

No doubt, people everywhere are beginning to have enormous expectations of technology. They believe that information and technology linkages will bring them into the mainstream (a place where few people feel they are), that they will receive great economic benefits, that technology will help make them upwardly mobile, and that soon many of them will be able to learn and work mostly at home.

Educationally, they want additional opportunities they have been denied because of distance and time; they want improved quality of instruction -- especially in mathematics and the sciences --; they want greater cultural opportunities; they want continuing education programs; they want their children to be able to compete for jobs.

Yet we know these expectations are not immediately realizable. Development costs are expensive. Technologies have many built in barriers. The barriers to using technology are best outlined in a paper by Milan Wall and Raymond Lewis, for the publication, Wiring the Ivory Tower.

They divided the barriers into three categories: structural, technical and attitudinal: Structural obstacles included budget and administrative policies, lack of incentives. lack of training, lack of collaboration with other institutions, too little technical support, and insufficient resources.

Attitudinal barriers dealt more with the user: Concerns about job security, bad experiences with computers, too much emphasis on hardware, inequitable access to telephone and computers, and too few support services.

Technical barriers included lack of technical support services, incompatibility, the unfriendly nature of hardware and software, and the lack of high quality instructional materials.

The barriers have not changed much over the years. Let me go back to 1988, when we initiated our FIPSE project, computer conferencing as an instructional device was practically unknown in educational circles. In fact, most computer conferencing and E-Mail operations were concerned with the effectiveness of communicating with people in a different way, rather than any consideration of its instructional value. A few places were concerned. New Jersey Institute of Technology, a pioneer in the use of computer conferencing, the New York Institute of Technology through its American Open University, Toronto's OSIE, New York University's Connected Education (or Connect ED) program, and the Western Behavioral Sciences Institute's executive program were the most active and best known.

Still, the experiments were small. New Jersey, for example, had trouble bringing together enough users to make their studies meaningful and had to rely on different courses, different instructors and even different schools to make up their basic groups for comparison purposes. (I might say, parenthetically that we should have paid closer attention to some of their experiences).

During this time, E-Mail and computer conferencing were being used here and there for inter-office communications and research programs, but there were few active studies to test the hypothesis that electronic interaction through E-Mail or computer conferencing was either academically or cost effective. The emphasis was on communications, not instruction. Happily, more schools and colleges experimented with it, but as noted earlier, there are not all that many.

Now let me talk about our FIPSE project in more detail. Three years ago the Academy for Educational Development, a not-for-profit consulting and management organization, received a grant from the Fund for Improvement of Postsecondary Education (FIPSE) to explore the possibilities of using computer conferencing as a means of instruction. The idea was to compare computer conferencing instruction with traditional instruction by using the same instructors teaching the same courses by two different methods. The students would come to the campus only for examinations. The study was later modified to include comparison of traditional courses with video-based courses, too.

Our three-year study demonstrated two things: First it exposed some of the basic problems of introducing and maintaining the computer as an interactive instructional tool; and second, it confirmed the long-range potentialities of inter-active computer instruction.

While these two general conclusions might sound a bit contradictory, the fact remains that we are far from convincing the masses of faculty and students of the effectiveness of inter-active computer communications, even as our vision of the immense possibilities of the method is re-enforced by studies such as this one.

The original design of our FIPSE grant called for a semester of planning and training, four semesters of teaching, and a semester for evaluation and completion of the report. Originally, we were to teach two courses per semester. When we modified the system by including support for TV-based courses, we taught as many as 10 courses per semester. The two instructors who taught the first semester repeated their courses the second semester. In the last two semesters, when TV courses were supplemented by E-Mail, eight more faculty members participated. About 100 students participated in the E-Mail sections from the time the courses were first offered through this past Spring semester. Fifty-seven percent were female and 43% male. Seventy-eight percent were white, 10% were black, and 12% were "other" (meaning Asian, Hispanic, etc.) Ages ranged from 19 to 84. The median age was 30, the mean, 32 , with a surprising number of persons in their 60's and 70's participating. That raised the question among us senior citizens as to the validity of the old maxim, "You can't teach an old dog new tricks."

Even after the grant money was no longer available for instruction -- when we were in the evaluation stage of the grant -- the system continued as a regular part of the Montgomery College course offerings during the Spring semester. In fact, about 20 students have signed up for the E-Mail version for a basic programming computer course this summer. Moreover, five courses offered totally by E-Mail are scheduled for this fall. The money is gone; the program continues. Time and experience are important factors. It takes time for people to get used to conferencing. Good experiences enhance motivation in others.

The experience of using E-Mail as a supplement to the TV courses which were normally offered also brought forth some complaints. Learning and using E-Mail meant extra work for faculty, without extra pay or time off. In the main, however, faculty members who used it extensively found it helpful.

Our evaluations took several forms. We used questionnaires for both comparison groups at the beginning of each semester, and then different questionnaires for faculty and for students at the end of the course. Besides periodic planning and evaluation sessions, each of us -- the campus coordinator, the technical support person, and the project director -- wrote a summary evaluation at the end of each of the first two years of the project. Our final report is now in the process of being written.

In addition, We had an outside independent evaluator beginning the second semester and now have a different outside evaluator looking at the total project.

So here are some of the preliminary findings with personal comments of mine as to the implications of the findings and some suggestions for others who might be entertaining the thought of using this means of instruction.

First the good news: Students using interactive electronic communications did as well as those students who took the same course in the traditional lecture method. In some cases, E-Mail students did better but that may have been because of the nature of the students who used E-Mail who were generally highly motivated by the opportunity to overcome time and place handicaps.

Second, E-Mail instruction met the academic objectives of the courses. In fact, a number of faculty said they believed that the objectives had been met in a new and different way.

One interesting side-light to this conclusion, was the statement of one professor who had taught the course entirely by E-Mail and traditionally. She said that while her traditional students absorbed more information from the course, the E-Mail students thought more critically about the subject matter. This calls for further study.

Some faculty members noted that their own writing skills as well as those of the students improved, that they wrote more precisely than before. One professor noted that it was not the computer that was the variable in writing ability, it was the practice that came from the very nature of teaching with E-Mail. Students, of course, can only complete a computer conferencing course through writing. Therefore, they, too, gain, practice, in this much-needed skill.

Third, student satisfaction with E-Mail was high. They liked the quick feedback, the opportunity to "talk" with their fellow students; indeed, they went out of their way to help each other. A majority said they spent more time on the E-Mail course than they did in regular courses. They also cited committed faculty, good technical support (after an initial period of chaos), and the asynchronous nature of E-Mail which let them work on the course at their convenience. They liked the reduced travel time and costs and not having the hassle and costs of parking.

They also mentioned the support of the college administration which loaned them modems, and they especially liked the support of the technical backup (again, after a period when the support system was in disarray).

Another interesting side light: Faculty members said they spent more time than on a traditional course the FIRST time they taught the course, using E-Mail, but less the second time around. This poses the hypothesis that as they become more at ease with the computer, they may even be able to teach more students which makes the operation more cost effective from the institution's stand point.

The downside findings and conclusions are good warnings for other institutions contemplating the use of instructional E-Mail. The responses varied a great deal but were nearly unanimous in citing technical problems as the major draw back. This near-unanimous opinion was on the lack of technical support and the mid-semester breakdown of the software system during the first year of teaching. It almost became a disaster. We had to change from a computer conferencing to an E-Mail system in mid-semester. The old system was unpredictable. The experts could not answer technical questions. Some students began getting technical phobia. The breakdown also called for us to tailor the new E-Mail package to our needs, install the software and teach faculty and students how to use the new system. But while we lost a few students, many of them remained and finished the courses. We also hired our own support person at that point.

Other institutions need to know that success depends to a great extent on the role of the college's computer center and its backup capabilities, how it supports faculty and students, how well it knows the system, and how patient it is with people who are just learning how to operate a computer for the first time. The system began to run smoothly with few complaints from faculty or students when a technical person was assigned to the project. This direct support by the computer experts is essential.

Some students and faculty missed the face-to-face relationship. Both faculty and students said there should be a longer training period. Faculty members believed they needed training in how to teach with this media, to be exposed to teaching strategies that would work.

As for cost effectiveness, it was difficult to get reliable information. We do know that start up costs are heavy, but costs per student per course are alleviated the longer the system is in operation. For example, the College bought and loaned 25 modems for students and faculty and six computers for faculty members. The College will be using them over and over with new faculty teaching by E-Mail and students who take their courses.

We have some anecdotal information about costs: the young man who worked nights clerking at a hotel who could not have taken the course without E-Mail, the woman who was pregnant and could not always get to campus at the prescribed time for classes, the remarks of several who mentioned the relief of not having to drive 20 or 30 miles to class.

In a sense, this becomes "cost avoidance," a slightly more complicated result than plain "cost effectiveness."

Offsetting this "cost effectiveness" is the argument that in order to train people for the "information society" we must encourage computer literacy and effectiveness as part of the mission of higher education. The cash outlays may be high at the beginning, but just as it has in the administrative areas, the computer (combined with video in some cases) will be an important factor in the instructional process in the future.

Moreover, in the long run, widespread use will bring to institutions a different form of cost avoidance, namely, the costs of new buildings -- even new campuses. Provided, of course, that the program becomes large enough. But for the long haul technology can be cheaper than real estate and buildings.

Out of these facts and opinions, then, we came to several overall conclusions and recommendations. We are convinced that E-Mail or computer conferencing is a valid and important means of conducting distance learning programs. It has immense possibilities, especially as we avoid or resolve some of the problems which we experienced.

There are five major concerns which any potential user ought to concentrate on.

First, the planning process. We did not take enough time to plan the details of the operation. This included such things as the role of the computer center, the adequacy of the software, the need for modems and hardware, how to recruit faculty and students, what time and support the faculty members needed prior to teaching via this method, which constituencies were we after, which courses should be taught? Eventually, we solved all these problems but too often it was midst a crisis.

Second, training. We did not spend enough time training our faculty and students. With neophytes to the computer world especially, one needs to conduct a training session, let the people go away and practice and then come back for further training. And then repeat the process as often as needed.

Incidentally, one of the wrong assumptions we are likely to make is that only those with a great deal of computer experience will take these courses. While 80% of one class said they had used a computer previously, only 17% said they had taken a course in computer science. And only 10% had ever used a modem before.

Third, marketing. We learned after the first semester that marketing an innovative product like E-Mail had to mean more than putting a notice in the campus newspaper and the class schedule. We began to target audiences -- computer clubs, single parent groups, physically disabled organizations, local weekly newspaper readers, employees of corporations. We had thought that Montgomery County with a high per capita income, a number of hi-tech companies, and headquarters for several national organizations would be ready for credit courses conducted by computer.

We were caught between those who had, and knew about, computers but did not need the courses we were offering because they were highly educated, and those who needed our courses and did not have access or knowledge of computers. (We offered access to computers at the college but that meant the students had to come to campus which the program was designed to avoid.

Fourth, finance. Fortunately, the campus had money to invest in lap tops for the faculty (on a loan basis) and modems for both faculty and students. But up front costs are reasonably heavy and that fact should be built into the planning process.

Fifth, leadership. This not only means strong administrative backing from the top administration. It means recruiting prestigious faculty which will put a psychological stamp of approval on the innovation. It means a particular kind of leadership from the computer people who provide the backup. They have to be patient and able to explain complex ideas simply.

So where does that leave us. It leaves us with the feeling that despite the problems we had and despite the limited number of both students and faculty we attracted to the program, that ultimately more and more educators and trainers will adapt this method of instruction and training for their benefit.

To go back to my earlier statement. It is not a contradiction to say that we experienced a number of problems but still came to the conclusion that computer conferencing is part of our educational future.

End

Chapter in Empowering Networks: Computer Conferencing in Education, Waggoner, Michael D. (Ed.), Englewood Cliffs, N.J.: Educational Technology Publications (to be published in November, 1991)

COMPUTER CONFERENCING: THE CAUSES FOR DELAY

by

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Almost a decade has passed since I first was exposed to the powers of computer conferencing. It seemed too good to be true to one who had spent most of his life devoted to distance learning. Suddenly -- through the wizardry of computer electronics -- you could talk to people across the hall or across the nation. You could interact with others at the time most convenient to yourself. But best of all, you could organize your work around subject matter topics which, in turn, kept your messages organized as well as dated and timed. And all messages went into a data base from which they could easily be retrieved.

Little did I foresee at the time the problems inherent in adapting this marvelous technology to the needs of faculty, students, staff and administrators in American colleges and universities. The hardware and software were there, but the requisite attitudes and the will to understand, to accept, and to utilize computer conferencing were not.

My initial experiences with computer conferencing were as the creator and administrative head of the first American distance learning project that allowed students to complete all their university course work requirements by computer conferencing. As the project evolved, my staff and I quickly recognized the remarkable potential of this powerful new instructional tool, but over time we became increasingly frustrated as we saw the potential of computer conferencing for both on-campus and off-campus delivery of instruction going unrealized around the country.

But first, before the reasons for this academic "technology-lag" can be fully appreciated, it is necessary to understand the numerous facets and nuances of this new communications tool as I discovered them during my early work with this software.

THE POWER AND PROMISE OF COMPUTER CONFERENCING

When used either as a supplement to the classroom lectures or as the communications system for telecourses, computer conferencing impressed my staff and me with its ability to give everyone rapid feedback and to encourage lively discussions and a degree of involvement not often seen even in the classroom. These exchanges were between professor and students and between students themselves, and communications were always delivered and received at the time most convenient to the individual.

While messages in a conference were much easier to find than in electronic mail systems because they were numbered, dated and timed, we could still write personal messages to anyone who was on the system and receive private replies from them as well. This was particularly important to faculty members and students if they wished to speak privately with each other. One could also send a message to the group belonging to the conference as well as designate additional names of one or more non-conference members to receive the same message.

It wasn't long before students in our distance learning courses were asking so many questions unrelated to the subject matter discipline being taught that we established separate topics for counseling students -- such as in areas of financial aid, registration problems, textbook problems, study habits, even a small conference called "help" which was designed for the psychological and reenforcement support of the user.

Students joining a conference for the first time could return to the beginning of the conference and read all the numbered notes that had been transmitted up to that point in time. Often these new students just joining the conference found that their particular questions had already been answered by the professor, counselors, or other students in earlier notes exchanged at the beginning of the conference.

Students consistently reported to us that they were willing to ask more and to ask different kinds of questions on a computer than they could -- or would -- ask in a traditional classroom. While they still phrased their questions carefully on the computer, they were not as intimidated by the prospect of speaking up and voicing their own opinions in front of others on the computer as they were in the face-to-face classroom setting. They also reported that because of its asynchronous nature, computer conferencing enabled them to review notes, read new messages, and write messages whenever it was convenient for them, and that this was one of the most important features of the delivery system.

Because all notes in the conferences were dated and timed, we knew that students were working at varied hours -- some logged onto the computer in the wee hours of the morning, some late in the evening after children had gone to bed, and several liked the time before breakfast to do their reading and writing.

Besides discovering its power as an instructional and counseling tool, we also discovered how much computer conferencing improved our effectiveness and productivity as administrators. We set up conferences by subject matter, by problem areas, by committees, by administrative groups, and sometimes just between two of us to facilitate ongoing day-to-day communications about a variety of topics.

For example, as Provost of the program, I had a separate conference with my two top administrators, my three top administrators, my entire staff, several with advisory committees and a number of one-on-one conferences with other campus administrators, counselors, and faculty located throughout the university.

Similarly, my staff created conferences with the registrar, admissions office, the counseling service, office of veterans affairs, and a number of other campus personnel with whom they often dealt.

Even though my staff members were across the hall or in the vicinity (though some were miles away on another campus of the university), it was often easiest to type off a memo when it was on my mind and send it by computer without worrying about arranging a meeting or getting the person on the telephone (if it were to go to more than one person, that meant several phone calls). In other words, computer conferencing meant no more "telephone tag" -- no more endless telephone calls to set up meetings -- and it meant fewer meetings. The advantages of computer conferencing and organizing around topics with which one could associate in memory included easy retrieval by date, or name or word string which would trigger the computer's memory and bring forth long-forgotten details of messages we wrote or had read earlier in the week or month or even year.

Too often, I could remember only vaguely the nature of an exchange with staff members, but with a simple "find" command, I could retrieve the pertinent note or notes and be on top of the subject instantly. That retrieval feature alone made me a better administrator. Those of us who used computer conferencing regularly estimated that we increased our productivity by at least 25%. We could communicate with a great variety of people at our own convenience and with a single command. Conferencing meant no more relabeling computer addresses. It meant no more cumbersome and time-consuming getting in and out of electronic mail in order to read and write in the conference mode. And the "find" commands and sequentially-numbered notes stored in the data base made it easy for those of us with faulty memories to review materials.

We also found computer conferencing to be a very efficient tool with which to edit long papers or proposals where several people were needed to comment and critique. We simply created a conference with the name of the paper or proposal, invited those we wished to comment to join the conference, and began editing the paper collaboratively.

These longer papers transmitted to individuals and groups for group editing demonstrated another remarkable characteristic of computer conferencing. We could write the paper "off-line" on the word processor and "upload" it from the disc to the computer conferencing system. The receiver could "download" it from the computer conferencing system to his or her own disc -- and printer -- for review. The paper could be printed directly from the conferencing system or from the local disc.

Thus, by sending the paper back and forth to several people at once, the author and critics could all see what the others were doing to the manuscript. And while one could send the paper to everyone in the conference, if someone outside the group needed to see a particular version of the draft, that person could be included in the editing process -- as an outside individual -- as well. Thus all the conference members and the "outside" individual would see the same draft version.

These uploading and downloading features are particularly important when long distance telephone charges are involved. Composing "on line" over long distances is expensive. The ability to compose "off line" and then transmit documents "on line" in a matter of seconds or minutes rather than over hours of composition time is a tremendous cost advantage of this technology.

All conferences were private, confidential, and electronically secure. Nobody else could read the messages in a conference except those who had been invited to join that conference. The same was true of private messages: only the person addressed could read any particular individual message.

In our program, we had students from a dozen states, as well as one in France and four in Japan using computer conferencing to complete their degrees. Many were students who needed 12 to 30 hours in order to graduate. At the end of the first year of our program, six students were graduated -- and because of the convenience of computer conferencing, most of them had never set foot on the campus. The interaction between staff and professors with these students had been entirely by telephone, by mail, and by computer conferencing. Almost all the students preferred the rapid response and personal attention of the professor over the traditional classroom lecture method.

In our program, for example, faculty became particularly challenged by this new instructional tool and responded to it with many new and creative teaching techniques. Professors created branch conferences from their main conference for the course; they then divided the students into teams letting them create their own sub-conferences to discuss various course subjects, returning later to the parent conference with their conclusions. Other professors created student polls, followed with a branch conference to discuss the results of the vote. Or they prepared short quizzes and gave assignments by computer conferencing. But the most lasting impact came from the free-wheeling discussions that revolved around each topic established either by the professor or the students.

Related to faculty use of computer conferencing for teaching is the issue of ideal class size. Nobody yet has figured out the ideal size of a class being taught by computer conferencing. In those schools where there have been 10 to 20 students in a class, faculty members have complained of a huge workload the first semester. But then, during their second semester of teaching the same course by this method, they find that many of the same questions are being asked of them as were asked during the first semester.

From these early experiences, faculty learn to file their carefully prepared responses on the computer when they first prepare them during the first semester of computer conferencing teaching. That way they can bring them up on the screen the next time the same questions are asked in subsequent semesters. They simply modify and personalize the message and send it off to the second -- or third or fourth -- group, thereby saving time and effort. In other words, the learning curve for computer conferencing teaching appears to peak quickly during the first and second semester -- regardless of class size -- and tapers off sharply with experience.

COMPUTER CONFERENCING VERSUS ACADEMIC REALITIES

While I now find myself even more excited about the potential of computer conferencing than I was during my initiation into the field in the early 1980s, my original predictions that this new system of communications would sweep across the academic world like wildfire were fantastically incorrect. The vision has so far lost out to academic reality. It has not been a wildfire, but more like a smoldering ash.

Why hasn't computer conferencing been adopted more widely and more quickly by the academic community? My experiences suggest there are five basic reasons:

1. Attitudes
2. Organization and Structures
3. Training and support
4. Marketing
5. Costs

1. Attitudes

The most powerful force inhibiting the use of computer conferencing by faculty, administrators, and staff is fear. Fear of the computer; fear of their own technical inadequacy; fear of their colleagues' contempt. Many potential academic users have made up their minds that the computer simply will not help them in any way and they do not wish to be bothered with learning how to use it. But a large part of that attitude is based upon fear of the unknown or upon previous bad experiences with technologies either in the home or in the institution.

In short, their "attitude" problem is more with the computer and all it stands for rather than with computer conferencing as a communications technique.

Faculty, administrators, and staff often are intimidated by the technical jargon of the computer experts or by the unintelligible prose style and ubiquitous but unexplained acronyms of the typical computer manual. Those who do step forward and learn to use the computer also unwittingly scare off their fellow colleagues with the zeal with which they flaunt their newly acquired "in" group technical language.

A number of faculty members harbor an unwarranted fear that if computer use becomes widespread in instruction, fewer faculty will be needed on the campus and therefore this imagined decline in employment demand might ultimately affect their own jobs. However, there is no hard evidence that the computer ever has eliminated a single faculty position on the campus.

Another false fear arises from the classic "turf" issue concerning who is responsible for instruction on the campus. Many faculty fear that instructional programs and software prepared elsewhere -- i.e., off the campus -- might make them look bad by comparison. In fact, computer conferencing encourages exactly the opposite result. The professor remains in total command of the course and communicates with his or her students extemporaneously. The professor retains full control of the subject matter and how it is taught. Therefore, faculty need to be reassured that computer conferencing is a communications software tool -- it is NOT an instructional software package.

If these generic fears of the computer -- whatever the source -- can be overcome, many more faculty members, administrators, and staff will become involved with the technology.

We know that change comes slowly in colleges and universities and we know that by and large the present generation of faculty and staff were trained in traditional methods. We know also that to overcome these attitudes we must devise different strategies and approaches to lure them into the world of technology. Computer conferencing, because of its immense and immediate benefits is a good place to begin.

Before faculty, administrators, or staff members will commit themselves to trying out such a system as computer conferencing, they must be convinced that the new procedures will help them. Simple demonstrations can prove to them that they can improve the quality of their instruction, save time, or make their tasks easier.

There is no doubt that computer conferencing calls for a change in pedagogy. If a faculty member, for example, does not want to change from the traditional classroom lecture format to a system that offers even more interactive communications possibilities between professor and students and among students themselves, then there is indeed something to fear, namely that professor's indifference or hostility toward the idea.

The same is true of the administrator or staff member. If people are irrevocably wedded to the status quo means of communicating -- namely, the telephone, the mail, and face-to-face meetings -- then no amount of persuasion or seduction will succeed in demonstrating to them the value of computer conferencing. As one president told me, "My system of communications has worked for years. Why would I want to go to all the trouble of learning how to deal with my staff and faculty differently? Besides, I'm not sure I want people to have that much access to me." The last sentence may say more about the president's real fears than the former.

As for instruction, computer conferencing calls for a high degree of involvement by both the professor and the students. It also calls for provocative, seminar-type discussions rather than the classroom lecture. Some professors cannot or will not make this change in instructional delivery format and its corresponding requirements.

Yet almost all the experiments to date indicate that both students and faculty feel more involved in the learning process when using computer conferencing than they do using any other delivery system -- including face-to-face classroom lectures. The feedback is positive, consistent, and very rapid. And constant reenforcement of the user promotes an intimacy and respect not often found in traditional classes.

2. Organization and Structure

In many colleges and universities, the computer center dominates and drives the technology life of the institution. Computer experts with their special argot and often condescending ways expect the average faculty or administrative staff member to understand almost as much as the expert. For many computer center "computer jocks," contending with ignorant or slow learning faculty, administrative staff, and students is a chore and a bore. In at least one institution, for example, the computer center refused to deal directly with students! All inquiries had to come through a professor -- many of whom did not even know what questions to ask themselves.

There are signs that these early demonstrations of arrogance are passing on the campus. Instruction manuals are becoming somewhat easier to read and are no longer dedicated exclusively to the "computer literate" alone. Special staff with superior communications skills and interpersonal sensitivities are being hired by the centers to deal with the "computer illiterate", those confused and frustrated people who dwell outside the technical world of computers.

But despite efforts of many institutions to centralize computer operations for reasons of efficiency, economy and effectiveness, the very nature of colleges and universities makes these goals difficult to achieve.

Academic and administrative departments often differ about their software and hardware requirements, about what kind of support system they need, and about who needs to be trained and by whom. In many institutions, an informal laissez faire policy permits a variety of incompatible hardware and software systems to emerge and coexist like the variety of species in a zoo. This decentralization makes it difficult for something as interactive as computer conferencing to thrive in the academic zoo where so many species thrive.

In some institutions, several different conferencing systems are in operation (often without any one system knowing about the existence of the others). Moreover, an even greater problem is that computer conferencing, even when installed, often serves such a small proportion of the population. Usually, one professor or administrator introduces the system and it is subsequently used only within his or her particular circle of correspondents. Few people know that the same conferencing system can serve many other needs as well -- instructional, counseling, or administrative -- and handle hundreds of users in a variety of disciplines.

3. Training and Support

Of all the issues facing college and universities involved with technologies of any sort, training and support services are the most vital. It is amazing how many institutions and schools and states are willing to spend most of their time, effort and money on hardware and software, and then such a disproportionately small amount of each on training and support. This is particularly true of computer conferencing.

Yet over and over again, we find that what makes a conferencing system bog down or dry up or just plain die on the vine is the lack of proper training and support.

Several operating principles have emerged in recent years from trial and error experiments with computer conferencing.

First, at the beginning the training program often has to be one-on-one or one-on-two. For example, faculty often will not ask questions in front of peers; they need the privacy of a small session to ask what they deem to be the "dumb" questions.

In one of the first computer conferencing training sessions I ever attended, about 15 faculty members (many of them professionally distinguished in their fields) sat around listening to the presentations, but very few of them asked questions in the group. We even had assigned floating mentors to move from computer to computer during the training session, but still there seemed to be this terrible reserve on the part of faculty to participate openly.

Later, we realized that these distinguished faculty members were used to being viewed as authority figures -- they were NOT used to being learners, especially in front of their peers. And thus, in this environment, they simply were not going to ask what they feared would be a "dumb" question about how the computer or the conferencing system worked.

Later we discovered that when we offered one-on-one or one-on-two training sessions, the questions flowed more easily and the sessions were more successful.

Second, for many people, the trainer cannot begin at too low or too basic a level. The trainer must begin with the assumption that the learner knows nothing about a computer. This is true whether one is teaching a faculty member, an administrative staff member, or a student. I usually begin by pointing (with some humor, I hope) to a computer's electrical cord and explaining, "This is an electrical cord, and these two prongs are what go into the wall..."

In training workshops with 10 or 15 people, one has to spend a good part of the first session convincing the people who are trying to learn that no question, absolutely no question is too "dumb" to ask. Usually, the new user will begin the question with something like, "Well, I know this is a dumb question..."

"Hold it right there," I say, and then try to convince that person and the rest of the group that they must feel free to ask any question or else we are all in trouble.

Moreover, the technical terms, the jargon, the nomenclature, must repeatedly be translated into simple terms until the learner gets some experience. Far too many people have been turned off to computer conferencing by trainers who have assumed the audience knew more than they really did. In some cases, the trainer must help translate the manual, too!

Third, positive reenforcement is one of the most effective training techniques a trainer can use. Slow steps, reenforced at every juncture, continued practice, more reenforcement, and finally the learner will begin to experiment.

Fourth, support services are closely allied to staffing and training. Implicit in any full-scale computer conferencing operation is the importance of having full-time "trouble shooters" available to help faculty, staff or students at any time within the work day.

That calls for having technical experts available to answer questions about the modems, the telephone connections, the main operating system -- just about anything that supports the conferencing system and that could be problematical or not work properly, making life difficult for the computer conferencing user. Some of these support services coincide with the training function, but unless this backup technical expertise is available in a timely and coherent fashion, the system will lose customers in the long run. Many institutions have installed computer conferencing systems only to wonder why the usage is so small; it's often because either the school did not train sufficient numbers of people properly in the beginning or did not provide the support system necessary to encourage participation throughout the duration of the course.

Institutional response to the issues of support services vary greatly. I know of one college where the computer center will not deal with students; every request for help must come through a faculty or staff member. Another school I know has exactly the opposite policy. Not only will they serve everyone in the institution, if someone has trouble with their computer at home, the computer center staff will go to the home to fix the problem!

Part of the training and backup support for computer conferencing systems should involve the use of instructional technology. This is just a multisyllabic term referring to the technique of helping faculty learn how to use computer conferencing with maximum effect in the teaching-learning process.

For example, when computer conferencing is going to be used in a course in conjunction with video courses, the instructional technology experts can help separate those parts of the course that best lend themselves to being taught by print, by video, and by interactive computer conferencing. When used in combination, these different means of communication can become a single powerful learning tool.

As some professors learn how to integrate computer conferencing with their courses, they can, in turn, teach others. In this case, providing released time for faculty to work on integrating technology into their courses is also a vital ingredient of a successful conferencing system. It not only provides the necessary course development time for the faculty but it acts as a reward system for those who become involved with technology.

Furthermore, using the more advanced students and interested administrative staff to help provide for technical support services -- in addition to the instructional expertise of faculty -- makes it possible to build a strong comprehensive support system at a reasonable cost.

Finally, the issues of training and support services are all of a piece. When combined, they give an accurate measure of the extent of the institutional commitment to fully utilize and support computer conferencing programs.

4. Marketing

In a recent and potentially significant project at Montgomery Community College in Rockville, Maryland, we learned an unpleasant lesson.

In 1988, The Fund for the Improvement of Postsecondary Education (FIPSE), an arm of the U. S. Department of Education, funded a three-year experiment that will enable us to measure, compare, and contrast the academic and cost effectiveness of courses taught entirely by computer conferencing with the same courses taught in the traditional classroom lecture mode.

The design of the experiment required that the courses would be taught by the same teachers during the same semester, with one section being taught in a traditional lecture format and the other being taught completely through computer conferencing.

The professors were trained by us in the correct usage of the hardware and software and they adapted their courses and teaching techniques from lecture modes to student-teacher interaction by computer.

The College recruited students through traditional college marketing techniques -- by placing special articles about the computer conferencing opportunities in all its college catalogs and related promotional mailings.

We sat back and awaited the anticipated influx of enrollments.
But not very many students came. It was embarrassing. In analyzing our failure to recruit a

satisfactory number of computer conferencing students, we realized that besides the fact that computer conferencing was a new "product" offering on the campus market, we had not marketed it well. We had been content with routine collegiate marketing announcements in traditional campus mailings. We had made the classic marketing mistake of using traditional marketing techniques to market a very nontraditional product to what we had also failed to recognize was probably going to be a nontraditional user market.

Montgomery County is a rapidly growing residential and commercial county just north of Washington, D.C. and it is one of the most affluent and upwardly mobile counties in the nation. Companies such as IBM and the Marriott Corporation are only two of a number of the Fortune 500 companies that either headquarter or have huge installations in the county. Furthermore, the College's main campus is located in the heart of this metropolitan area's largest "high tech" corridor. Computers, we knew, were located on most desks in most offices within a ten mile radius of the campus.

So in preparing for the second semester of our experiment, we completely revamped our marketing strategy to more closely fit our product. First, we carefully defined a number of target student audiences. Second, besides the standard notices and stories in the College's publications, we studied the demographics of our newly identified target markets in order to draw conclusions about the lifestyles of our potential students.

As a result of this research, we advertised in a regional magazine devoted to computer communications. We designed direct mailings for groups such as Parents Without Partners. We also sent direct mailings to all pre-registrants in the courses where computer conferencing was going to be offered. We sent a marketing letter to 175 corporate personnel officers. Direct mailings went out to a number of groups who work with and for the physically challenged adult community, a group we knew often had special difficulty commuting to the campus. We placed feature articles in the widely read Montgomery county neighborhood newspapers and advertised in both the Washington Post and the suburban Maryland daily newspaper.

One of the major marketing problems we discovered from analysis of our dismal first semester marketing efforts was that while many potential students had computers either at work or at home, precious few had modems or knew how to use a modem to communicate by computer, either through electronic mail or by computer conferencing.

Consequently, for the second semester of the experiment, the College bought a number of modems for our students and we advertised in all of our marketing pieces that the modem -- plus the training on how to use it -- would be free to all enrolled students in our courses.

As a result of reorganizing our marketing according to a careful analysis of our projected student market segments and those students' lifestyles and needs, by registration day we had more than our minimum quota of enrolled computer conferencing students for each of the courses in our experiment.

Having learned our marketing lesson early, we anticipate that future enrollments will become even more impressive and that by the end of the FIPSE experiment we will be able to contribute important new knowledge to the solution of what has been one of the major stumbling blocks to the adoption of computer conferencing on the campus -- namely, recruiting sufficient numbers of students to justify the investment by the institution.

5. Costs

Estimating costs for computer conferencing is a highly imperfect art. Doing so accurately depends on where you start. If the institution has NO computers and one has to start from scratch, it can be very expensive. But today most institutions have computers, either at a person's desk or in a laboratory. Many institutions are now creating local area networks that tie computers together in an interactive mode. Many students and faculty are buying their own computers, and many working students have access to computers in the work place.

All this, coupled with the continuing downward spiral of prices for computers and the necessary add-ons, means that the costs for adequate hardware and software are no longer out of reach for most people.

For computer conferencing, the institution does need the system software for whichever system will be used. Prices in 1989 range from $3,000 to $25,000, with $10,000 being the average for a system that will handle large numbers of users. These costs, too, vary and will presumably decline in the coming years. In addition to the computer, the individual user will need a modem to transmit the messages over the telephone line and communications software (to tell the modem how to do it).

If all the users are in the same area, everyone will dial a local number for access. However, if students, for example, need to call long distance to reach the teacher, then there will be additional telephone line charges.

There are several ways in which telephone line charges can be handled:

First, each student can pay the long distance charges of their communications with the class.

Second, the school can contract with a company that operates a computer conferencing system and pay the company on an hourly use basis, which can become expensive if no limits are placed on the "on line" time available to the student. The estimated (or maximum allowable) charges for the time each student will use the telephone lines during the course is usually built into the tuition.

In recent years, these phone line costs have decreased rapidly because of the computer's ability to "upload" and "download" messages to one's own disc thus bypassing costly "on-line" time previously required to type out the message or to read it while receiving it "on-line." In other words, if messages are composed on the computer's word processor and "uploaded" into the computer conferencing mailboxes, only a couple of minutes of telephone time line charges are used. The same cost advantages accrue when the inbox of all the messages received by a user are "downloaded" to a local computer where the user reads them at leisure "off line."

Obviously, these initial expenses and ongoing costs restrain administrators, faculty, staff, and students from using computer conferencing. But costs even in the last decade have dropped dramatically and they will continue to do so.

Additionally, too often, institutions consider only hardware and software costs when considering conferencing systems. It is imperative that the school also calculates other related costs including that of training personnel, released time for faculty course development, and a support system that operates with the same hours that the library is open.

The most powerful argument for computer conferencing rests not on costs but on its ability to span distances both long and short, to empower the professor and students to interact with each other rapidly and extemporaneously, to gather around the electronic table those people who wish to participate and, with single commands, communicate with everyone else in the group --each doing so at his or her own convenience. That is a power that we have not had until recently.

It may take longer than any of us thought for computer conferencing to be utilized the way we initially envisioned. Originally, distance learning was thought to be the primary target area for this new communications tool, and it is pretty clear that distance education will hold some sizable share of the market. But over time, the real expansion will come from successfully integrating computer conferencing with audio and video and print materials. The laser disc, the fax machine, the audio and video recorders, along with the computer, will be used in combination with each other. And in those developing combinations, used either on campus or off campus, computer conferencing will play a significant role.

Delivered in May 1990 at the National Conference on Adult Learners, Columbia, SC and at the 8th Annual Conference on Non-Traditional and Interdisciplinary Programs, Virginia Beach.

ALTERNATIVE INSTRUCTIONAL APPLICATIONS OF ELECTRONIC MAIL

Tim Peterson

Introduction

Electronic mail systems are being used increasingly around the country for alternative instructional applications in higher education. Houston Community College, the University of Virginia, and Syracuse University are just a few of the many institutions that are using such systems to link faculty and students together across time and distance. Montgomery College, a multi-campus community college located in the Washington, D.C., suburbs, and the Academy for Educational Development are currently conducting research on the instructional and cost effectiveness of electronic mail (e-mail). The research is being supported in large part by a grant from the Fund for the Improvement of Postsecondary Education (FIPSE).

The initial research followed a quasiexperimental design in which different courses were taught by both e-mail and by traditional lecture methods. Most variables (e.g., instructors, texts, assignments, etc.) were held constant: 1) to determine if students could use e-mail effectively to learn different subjects; and 2)to see if e-mail was cost effective for both the institution and for students. The College is now testing the efficacy of the system in combination with existing telecourses and eventually plans to make the system the nexus of an accelerated General Studies degree program. A brief review of the FIPSE research project, the problems and results of the project, and our future plans are the topics of this paper.

The FIPSE Project

The original FIPSE proposal was the work of Dr. Don McNeil, a senior program officer at the Academy. It was to be a three year project that would take two different courses each year and compare the results of teaching each of them in three different ways: by

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computer conferencing (e-mail), by traditional lecture/discussion, and by a combination of the two methods. The mixed e-mail/lecture component was eliminated before the research project was initiated.

All variables (e.g., instructors, texts, assignments) except the instructional method and the assignment of student groups were to be held constant. We could not, nor did not want to, randomly assign students to the different groups. Rather we collected data on what we considered to be the relevant demographic, economic, and academic characteristics to determine the similarity between groups. We recognizied that any significant differences would restrict our ability to generalize from our findings. It should be mentioned that the original proposal used the terms computer conferencing rather than electronic mail. The difference is that the former provides for group discussions as well as individual messages whereas not all e-mail systems have a group discussion capability. Although our system has the group discussion feature, we eventually adopted the latter terms because we thought it would be more familiar to our students.

We began the project in the Fall of 1988 with an American history course and a health course. The courses were selected for three reasons: there were multiple sections, which would allow for the easy identification of the comparison lecture sections; they met general education distribution requirements and thus (we thought) would increase our ability to recruit students into the experimental sections; and, most importantly, we had two faculty members who were excited about the project.

Research Assumptions and Hypotheses

On the bases of our professional experience and familiarity with the relevant literature, we assumed that:

> e-mail offered several advantages over the traditional lecture method (e.g., students did not have to travel to campus, they could send and receive messages or assignments any time day or night, they might improve their writing skills, and they might learn something about computers and telecommunications); that
>
> many part-time, adult students would own or have access to personal computers (Montgomery County has the fifth highest per capita income in the country and is home to

> numerous high-tech firms); and that
>
> the College would increase the utilization of its mainframe instructional computer, which was operating below full capacity.

We hypothesized that students could use the system effectively for learning different subjects and that it could be cost effective for both students and the College. Before describing some of the problems we encountered in conducting the research, it may be useful to recall an observation by Howard Becker (1965) from a quarter-of-a-century ago:

> The best laid research plans run up against unforeseen contingencies in the collection and analysis of data; the data one collects may prove to have little to do with the hypothesis one sets out to test; unexpected findings inspire new ideas. No matter how carefully one plans in advance, research is designed in the course of its execution (p. 602).

Technical Problems

We encountered two major technical problems and a host of minor ones. We had chosen an integrated PC software package for the faculty to use in conjunction with the e-mail system because of its power, compatibility with other software, ease of use, and low cost. However, the mainframe required the use of a specific albeit free communications program that limited users to IBM compatible machines. The communications software proved to be the first major problem because it did not interact well with the original e-mail software. The second major problem was the e-mail software, which did not run well on our mainframe computer. Ultimately, we abandoned the mainframe and the original e-mail software and set up a bulletin board system (BBS) on an AT type personal computer that allowed faculty and students to use a variety of hardware and software. This was accomplished through the efforts of Ben Acton, a telecommunications faculty member who had been granted release time to assist us with the project.

Other Problems

A significant and unexpected problem was the need for increased marketing of the e-mail courses. Only four students enrolled in the first e-mail section of the health course and none in the history course during the 1989 Spring semester. We discovered from the comparison lecture sections that most students had personal computers, but very few had modems or communications software. Thus we increased our marketing for the 1989 Fall semester and purchased both modems and software to loan to students who needed those resources. We enrolled 13 students in each of the two e-mail sections that semester.

In preparing the second year FIPSE proposal, we decided that we would test the ability of the e-mail system to enhance student learning in our existing telecourses rather than continuing the e-mail only course research. We assumed, erroneously, that telecourse students and faculty would be more inclined than their campus peers to use the system. We provided the faculty with laptop computers and software and encouraged them use to these resources for any other purposes they desired. We were aware of the difficulties encountered by another institution that attempted to do this several years ago but felt confident that we could avoid most, if not all, of those problems through appropriate training and technical support.

Results of the Research

The technical and marketing problems notwithstanding, the results of our research are both enlightening and encouraging. We currently have 16 students actively participating in the e-mail section of the American history course and another dozen telecourse students are using the system as well. Six of the 11 telecourse faculty are now on the system and we probably would have had more except that a delay in the delivery of the laptop computers limited the amount of training that we could provide faculty prior to the start of classes this semester.

Students enrolled in the courses shared many of the same demographic and other characteristics. Students in both types of courses were predominately white, in their thirties, working full-time, with similar academic backgrounds. A greater proportion of women were enrolled in the lecture sections than in the e-mail sections.

With respect to the instructional efficacy of the system, we found few real differences between the students in the e-mail and lecture course sections. Student performance as measured by pre/posttest scores, course assignments, final exams, and final grades was generally comparable between the e-mail and lecture sections.

Students in the e-mail sections generally agreed that the e-mail system increased their confidence in working with computers and improved their writing skills. The attrition rate for the history e-mail course section was the same as that for the lecture section but much higher for the health e-mail course section than its lecture counterpart. We suspect this was because the history instructor placed a much greater emphasis on discussion than did the health instructor. All but one of the students who completed the e-mail sections indicated that they would take another course via the system.

The data thus far also suggest that the system can save students both time and money. Although the e-mail students spent about 50 percent more time on course assignments and readings than the lecture section students, they saved approximately one and a half hours a week by not having to commute to campus. They also saved about $45 per semester on transportation costs. Only two students reported having to spend additional money on computer equipment or supplies to take a course by e-mail.

Whether or not the system is cost effective for the institution remains to be seen. The start-up costs can vary significantly depending upon the configuration of the system. We spent approximately $6,000 for the BBS hardware and software although you could spend considerably less for a less sophisticated system. We will spend about $19,000 on salaries this year to set up and operate the BBS. However, this figure can be misleading because it reflects the cost of using part-time faculty rather than the actual full-time faculty who provided the technical support for the system. Nevertheless, we believe that the on-going operational costs of the system will prove to be reasonable, particularly since the existing College classroom facilities are already being used to full capacity and that plans to build new facilities have been delayed because of state and local budget constraints.

We also provided faculty the same amount of release time to adapt their courses to the system as they normally received for teaching the courses. Most of their time was spent on learning the system, facilitating student discussion, and uploading and downloading files on the system. We think that the work of these "pioneers" will be very helpful to other faculty who use the system in the future.

Future Plans & Potential Applications

Given the proper marketing and support services (e.g., better documentation and training) we believe that the e-mail system cannot only enhance student learning, but that it can be used effectively for related applications as well (e.g., advising, tutoring, student study groups, etc.). Thus, we plan to use the system as the infrastructure of a new accelerated degree program in General Studies that part-time students will be able to complete in three years by taking one evening, one weekend, and one telecourse a semester. In addition to being extremely convenient, the program will expose students to a variety of alternative instructional methods which we think will enhance their ability to acquire and process information in an increasingly complex world.

Finally, we are hopeful that the numerous features of the system (e.g., a 64 phone line capability with on-line interaction, a library, etc.) will provide students the chance to create a learning community similar to that found in a residential program, an opportunity that commuter students rarely find on today's campuses.

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REPORT ON TECHNOLOGY IN HIGHER EDUCATION AVAILABLE

How technology can increase access, improve quality, and be cost effective for colleges and universities are issues discussed in *Wiring the Ivory Tower – A Round Table on Technology in Higher Education*, a new publication of the Academy for Educational Development. Dr. Donald R. McNeil of the Academy edited the document and wrote the summary of the Round Table, which brought together 28 leaders from industry, labor, foundations, government and education.

Deliberations concentrated on five themes: Access, quality teaching and learning environments, training and support systems, collaboration and cooperation, and finance.

Milan Wall of the Heartland Center for Leadership Development in Lincoln, Nebraska, and Raymond Lewis, president of Learning and Technology Services of Portland, Oregon, wrote a section on "Exploring Obstacles to Uses of Technology." The essay outlines a number of structural, technical and attitudinal problems facing institutions as they seek to integrate technology into their instructional programs. The paper served as the basis for the two days of discussions.

Two case studies demonstrate the degree to which these obstacles can be overcome. Jan Baltzer of the Maricopa Community College District (Arizona) and Susan M. Rogers of Rochester Institute of Technology analyzed the programs of their institutions in relation to the five themes that emerged from the conference.

The Academy for Educational Development, sponsor of the round table and publisher of the document, is a consulting and management firm in Washington, D.C., with special interests in developing technology for teaching and learning, counseling and administration.

For further information on the Academy's program in higher education management, contact Donald R. McNeil, senior program officer.

To order *Wiring the Ivory Tower*, send $7.00 to Ms. Marjorie Webster, publication coordinator; for more information, including prices for bulk order, contact Ms. Webster at (202) 862-1900.

WIRING THE IVORY TOWER:

A Round Table on Technology in Higher Education

Donald R. McNeil

AED
Academy for Educational Development

WIRING THE IVORY TOWER:

A Round Table on Technology in Higher Education

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1990

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Introduction

"Technology in Higher Education," a two-day conference sponsored by the Academy for Educational Development in Washington, D.C., in December 1988, brought together 28 of the nation's most experienced leaders in the uses of technology in higher education. The purpose of the conference, called the Technology Round Table, was to foster discussion among the participants on the uses of information technologies in teaching and learning. The conference grew out of the Academy's long commitment to sponsoring appropriate applications of technology to meet educational goals. The summary of the round table discussions appears in Part I of this report.

Prior to the round table, the participants – representing industry, labor, foundations, government, and higher education – received a paper the Academy had commissioned. The paper, "Exploring Obstacles to Uses of Technology in Higher Education" by Raymond Lewis and Milan Wall, outlines the various obstacles confronting colleges and universities as technology becomes an increasingly vital part of their instructional, counseling, and administrative programs. The paper, which emphasizes instructional uses, constitutes Part II of this report.

The conferees met both in general session and in small discussion groups. During the discussions, it became clear that boundaries could not be drawn around any of the three categories of obstacles; that attitudinal, technical, and structural problems overlap and intrude upon each other in ways that defy easy categorization. Instead, five themes emerged from the discussions:

- Access and equity
- Quality teaching and learning environments
- Training and support systems
- Collaboration and cooperation
- Finance

The technical, structural, and attitudinal obstacles pervaded all five of these major themes. Almost every one of the obstacles mentioned in the Lewis-Wall paper was addressed but usually in terms of these five themes. Many of the questions raised during the round table merely hint at some of the more complex issues and strategies needed to overcome the numerous obstacles. We hope this summary of the conference will stimulate discussion and action in other institutions of higher education regarding the measures and strategies suggested by this group.

The two case studies in Parts III and IV may be of further help to those institutions desiring to apply technology intelligently. Two of the institutions represented at the conference – the Maricopa Community College District and the Rochester Institute of Technology – incorporated in their activities many of the themes that emerged from the conference, and their experiences provide models for other institutions.

I offer my sincere thanks to Jan Baltzer of the Maricopa County Community College District and Sue Rogers of the Rochester Institute of Technology, who spent a great deal of time and energy in providing the basic documentation for the two case studies.

Without the paper by Raymond Lewis and Milan Wall, the Technology Round Table would not have been the same. The paper provided a focus for the discussions and sparked many lively conversations during the two days. A special word of thanks is due to Melissa Kirchner, who was associated with every part of the round table – the invitations, the logistics of the meetings, and the preparation of this publication. I am grateful to Frances Hays for her superb editing of the entire manuscript.

The conference reenforced my belief that training is of the highest priority and that attitudinal problems constitute the single greatest obstacle to using technology. While cost savings may be made here and there, technology will not "save" huge amounts of money. Technology will be effective and accepted only when our educators realize that applied appropriately, it can improve quality, productivity, and access.

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Technology in Higher Education: A Round Table

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PART I

Summary Report:
ROUND TABLE ON TECHNOLOGY IN HIGHER EDUCATION

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"Current communications technology has become part of the social fabric of our institutions," noted one of the university participants. This statement followed several general propositions agreed to by members of the conference:

- The globalization of information is increasing at a fast pace as technology continues to diminish constraints of time and distance.

- The need for a skilled work force is escalating rapidly as technology transforms the functions of the individual worker and as competition with other nations grows.

- Improving productivity holds the key to the future economic success of the United States.

- Economic development is becoming increasingly dependent upon the educational system, forcing institutions, states, and nations to look at the "economics of knowledge."

- The infrastructure of the "information society" should be our educational system.

- The educational system is undergoing technological changes that challenge current assumptions about how people are taught, when they are taught, where they are taught, and the length of time they need to master particular subject matter.

Several overall conclusions about the use of technology in higher education gave hope to many of the participants. First, although numerous limitations and obstacles to the use of technology exist, they can be overcome and, in fact, are probably not as great as once thought. Second, a sizable number of institutions have accepted technology as an essential feature of their future existence, including institutions both small and large, wealthy and poor, and public and private. "Technology initiatives," said one participant, "are more widespread than is commonly perceived."

Despite this acceptance, the number of institutions and faculty members involved in significant technology-based programs remains relatively small. And, finally, attitudinal issues – how people perceive and react to these technologies – are far more important now than structural and technical obstacles in influencing the use of technology in higher education.

Conference participants concentrated their discussions on five major themes that embraced both these general conclusions and the obstacles delineated in the Lewis-Wall paper:

- Access and equity
- Quality teaching and learning environments
- Training and support systems
- Collaboration and cooperation
- Finance

Key points from the round table discussions are presented in the following sections.

Access and Equity

Almost all the conferees placed the need to increase access and equity high on the list of important questions. Distance education figured prominently as a means of achieving these goals. With technology, institutions are able to reach new audiences in different places at different times – often at the convenience of both the learner and the teacher.

These developments will encourage institutions to re-examine their assumptions about where and how people learn. For too long, institutions have focused on the *input* to the educational process, a concern which favors institutional and teacher needs; colleges and universities should be more *outcome* oriented with concentration on learning and the needs of the learner. Such an emphasis would lead institutions to examine the possibilities of alternative instructional delivery systems using a variety of technologies. Moreover, this trend would ultimately lead to a system that values performance rather than attendance.

With technology, institutions can provide adults a second chance at a college education, can reach those handicapped by time or distance or by physical disability, and can update the knowledge base of workers at their places of employment. The need to train for new types of jobs and upgrade current jobs was frequently noted as an impetus for developing technology-based education programs. Technology also can be a valuable tool for delivering remedial services to both on-campus and off-campus students. Of special interest is the possibility of using technologies to provide learning opportunities to rural areas. Those who are not served at all, as well as the underserved, deserve attention; "at risk" students, also, can be helped through technology. "Look to new boundaries," said one of the members. "Technology will change the present ones, and it offers opportunities that were not there before."

One of the business representatives urged colleges and universities to take risks as they attempt to reach new audiences through technology. "Distance learning is the wave of the future," one of the discussion groups concluded. More than ten million people in the world now learn through distance education programs, a college president noted, but Americans are not a significant portion of that number. Several participants pointed out how hostile many faculty members are toward distance learning, regarding it as an inferior and second-rate mode of education. Thus, advocates of distance learning face many challenges in overcoming the hostility engendered by technology itself as well as the prejudice against distance learning.

Much job training and retraining will occur in the workplace, the group predicted, and colleges and universities should be getting ready for those changes by becoming involved with technologies now. In many instances, business and industry already have established their own compensatory and remedial programs to make up for the lack of preparation of their employees.

Another critical element facing institutions that utilize technology in their distance learning programs is the attitude of state coordinating agencies and accrediting bodies. Here, too, deep feelings that range from misunderstanding to suspicion and antagonism prevail. Such animosities and misconceptions are aggravated when programs cross state or jurisdictional lines. Under these circumstances, innovative programs that use technology to reach distance learners become difficult to initiate.

Several members of the conference mentioned another form of inequity. They worried about the ability of smaller and poorer institutions to take advantage of communication and information technologies. Schools with large enrollments often have great audio, video, and computer capacities, while smaller ones do not. This disparity between richer and poorer institutions should be eliminated through better funding by both state and federal agencies and through collaboration of institutions in consortia.

Quality Teaching and Learning Environments

There was general agreement that technology, if used properly and appropriately, could enhance the quality of instruction either on campus or off campus. Participants stressed that technology should not be a solution going in search of a problem, but that identification of the problem should come first with identification of appropriate technologies to use to solve the problem coming next.

For example, an institution designing a program to serve an isolated rural area should not start with a video-based or computer-based program without knowing the extent to which the prospective learners have access to VCRs or computers. Audio programs supplemented by periodic visits by professors might provide a more practical solution. First comes the problem, then the choice as to which technology, if any, is most suitable.

Proper costing out of the various technologies becomes most important. Too many institutions concentrate on the hardware and software and do not plan for the expense of maintenance and of training for staff, faculty, and students. Great emphasis was placed on the need to make both faculty and students comfortable with the technology they will be using.

Round table participants also felt that the use of new technologies could result in improved student-teacher interaction. Despite its reputation for dehumanizing the learning process, technology can be humanizing by relieving tedium, offering more options to learners, and bringing teachers and students closer together through interactive programs that stress rapid responses.

The group also felt that significant progress is being made toward product compatibility. Although product standardization is not likely, product compatibility offers the user the same advantages as if hardware and software were standardized. Market demands have had a powerful impact on enhancing compatibility. Recent developments such as computer networks that can handle multiple models, interchangeable hardware and software, and the joining of voice, data, and video in one machine are examples of the progress now being made toward compatibility.

Many administrators, faculty members, and students are still wary of technology and do not want to be involved in its use. Luring members of the academic community into the world of technology is not an easy task. Changing attitudes toward the use of technology for instruction becomes a psychological challenge.

The process of introducing and converting higher education institutions to the use of technology must be aimed at all levels, especially at the top administrative level, the group concluded. Administrators need to be convinced that technology can help in the management of programs as well as the support of instruction. The commitment of the top administration is crucial to the successful use of technology applications. Such commitment sets the tone for acceptance at all levels of the institution and provides the necessary backing for staff and faculty.

For their part, faculty need released time, adequate hardware and software, and support from technical experts. A change in the reward system for faculty is critical. Most faculty now take on using technology as an extra task. Even if technology applications are part of an institution's program, most promotion and tenure systems make no provision for rewarding a professor who experiments with or uses technology to reach students either on or off campus. Faculty members need performance-based merit increases and promotions that include recognition of activities in using technology as well as in publishing. Ultimately, faculty should be able to regard the use of technology as a means of moving up the career ladder as well as of gaining personal and professional renewal.

Faculty also should have greater involvement in decision making about technology because they are the ones who will be using it for instructional purposes. Technical coordination and support should be provided for this process. And while faculty should be aware of administrators' needs for technology, faculty should be in a position to present their needs on a competitive basis. Until these alternate methods of delivering instruction are accepted as integral parts of the academic process and faculty are rewarded accordingly, little expansion in the use of technology on campuses will occur.

The search for resources to create friendly teaching-learning environments through technology is a critical factor in the success of technology applications. Too often administrators think only in terms of up-front expenditures for hardware and software. Other resource considerations are critical. Maintenance of equipment, technical support for the users, money for "incubator" projects to foster innovation, built-in allowances for amortization were all mentioned as important aspects of the support system needed to insure that technology is widely utilized.

Modifying the infrastructure of the institution becomes an important factor, too. The accessibility of large data bases through the library; the creation of networks among faculty, administrators, and students; and software applications for counseling, registration, and records all call for some degree of change in attitude as well as in function.

The lack of first-rate software and the need to adapt software to the faculty's existing teaching requirements have proven to be formidable problems in many institutions. Each faculty member is responsible for teaching particular classes and will have different ideas as to how and to what extent technology should be used. The use of technology changes the pedagogy. Teaching at a distance or using videotapes or interactive computers to supplement lectures calls for different methods than those used in standard lecture courses. Increased student involvement, more discussion of a seminar type, and greater reliance on critical comments and questions characterize technology-based courses.

Research is another area in which technology can help faculty members adjust to the new order. Through the computer, faculty can communicate with scholarly colleagues quickly and at great distances. With the advent of electronic mail and computer conferencing, cooperative research projects have increased tenfold.

Training and Support Systems

Establishing a friendly teaching-learning environment through provision of adequate resources, good incentives, and opportunities to experiment is closely associated with one of the greatest needs of all – training programs and the support systems to back them up.

Over and over the need for adequate training was stressed. Administrators and faculty members need to be trained in the uses of the hardware and software. For faculty who want to adapt software to their courses or create software themselves, training in programming and curriculum development is also necessary.

In a related discussion, several members felt that software design needed to be raised to the level of a discipline. With technology as a tool, professors will no longer be able to work entirely alone. They will have to adopt a team approach, with appropriate technical experts and curriculum designers working together as an instructional design team. Professors will require training to move from their once isolated position of designing entire courses by themselves to using the team approach.

Most participants agreed that the need for training will remain constant. New products on the market require new training for students, faculty, and administrators. Combining technologies in new delivery systems intensifies the need for further training. And new students and new faculty members create demands for ongoing training programs.

Facilities, too, will have to be modified. Most classrooms are ill-suited for video-, audio-, or computer-aided instruction and will require significant alteration to accommodate the technologies in order to maintain the rhythm, style, pacing, and substance of instruction.

But it was not just training in the use of hardware and software that concerned the participants. Training in *how* to teach with technology is just as important. Teaching learners at a distance calls for different techniques and methods than meeting with learners at a specific location at a specified time. Using computers for purposes of interacting with students demands methods and techniques – usually with heavy student involvement in back-and-forth discussions – different than the traditional lecture methods used by most faculty.

Collaboration and Cooperation

One of the points most frequently expressed in the conference was the need for cooperation and collaboration. That sense of cooperation should begin within the institution, several participants stressed. Technology is too expensive to let individual units create their own empires. Cooperation between departments, between individual faculty members and the computer center, between faculty members and students, and between administrators and faculty is necessary to take full advantage of technology in the academic setting.

Networking will enhance a sense of collaboration. Equitable allocation of funds for hardware and software will bring diverse groups together. If the total institution is committed to technology and a comfortable teaching-learning environment is established, interdisciplinary collaboration will result.

The participants called for other kinds of collaboration, too. The trend toward business-higher education partnerships can be accelerated through the use of technology. Industry's experience in using technology should be tapped. Labor unions should be contacted to see how the educational institution, by using technology, might create a better delivery system for union members. Larger, more affluent colleges and universities should create linkages with smaller institutions. Rural areas, especially, will need technical help to make decisions about the use of technology and are good markets for distance education programs using appropriate technologies. Institutions of all sizes should begin collaborating not only to unify as bases of knowledge but also to share the high costs of some applied technologies.

While the development of personal computers has resulted in great numbers of networks with less reliance on mainframe computers, many of the technologies are very expensive and require more centralization. States are beginning to look at their total telecommunications needs; some are buying dedicated transponders, while others are installing fiber optic lines to connect campuses with other state institutions. With educational institutions delivering distance education programs via technology, states are having to become increasingly involved. Coordinating boards and higher education commissions with the responsibility of monitoring all programs are reviewing those programs in light of individual state laws that govern new programs and the involvement of out-of-state institutions.

One of the major strategy recommendations to come out of the conference was the call for the establishment of one or more research and development technology centers. These centers would encourage compatibility of software, give focus to a national software development initiative, and stimulate research. In addition to designing training programs, the centers could provide the actual training programs for those who would be training others in the uses of technology. They could act as clearinghouses of information on the uses of technology anywhere in the world and manage collaborative efforts that were too large for any one institution to handle. In short, the technology centers would, with full cooperation of the constituencies, provide leadership for expanding the uses of technologies in colleges and universities.

As one participant stated, "We need institution-building of a kind that will give both prominence and permanence to the development and extension of technology throughout higher education." Or as another member suggested, "The focus of the centers would be to examine the use of technologies to resolve learning problems in very specific areas."

Finance

While most participants agreed that more funds were going to be needed to make the use of technology effective and widespread, there were sharp differences as to how technology should be paid for. Several members advocated increased federal funding, especially for hardware and software. Others felt that partnerships among educational institutions, industry, and federal and state agencies provided a more realistic approach to financing the adaptation of technology to the institutions.

As disciplines in the social sciences and the humanities begin to use technology, more money for hardware and software will be required. But throughout higher education institutions, increased funding will be needed for software design, training, maintenance costs, and technical support to the users – both faculty and students. This broader application, in turn, may lead to higher tuition fees.

Whether the financing comes from public funds, foundations, industry, or tuition and fees, the internal budgeting for technology will require close examination. Enrollment levels will have less influence on determining budget allocations than they do now. Technology's financial requirements will be built into the budget of every department as its use becomes more extensive in all disciplines.

An important factor in the financing of technology is what might be called "trade-off planning." With expanded productivity as a major objective, the additional dollars allocated to bring technology to education should be partly offset with reduction in costs or more productive efforts. New dollars displace dollars expended in old ways. For example, the money spent on automating attendance records and tracking student progress might be offset by not having to hire additional personnel as the numbers of students increase. Or it might result in making it possible for professors to spend less time on housekeeping chores and more time on providing quality instruction.

This "trade-off planning" or displacement of costs can best be achieved by those institutions that coordinate their technology planning. In many institutions, each unit plans its own approach to the application of technologies, and often this results in mismatches of hardware and software as well as in duplication and inordinately expensive programs. Centralized coordination, with input from the various divisions and departments, will reduce the overall costs of technology applications and will guarantee consistency and compatibility.

On the other hand, "trade-off planning" is not a panacea and will result in significant savings only in very specific instances. Even in those cases, such as when faculty are relieved from certain chores for a more cost-effective use of their time, the major result is improved quality of instruction, not necessarily extensive savings. Initial outlays are significant, but the result can indeed be increased efficiency and economy with avoidance of waste. Real acceptance will come only with the understanding that in addition to certain economies and efficiencies, the critical impact of technology will be to improve quality and increase productivity.

Much of the discussion summarized above applies to colleges and universities wanting to enhance their own efforts in using technology. But two ideas transcended the boundaries of single institutions and called for immediate collaboration and action. First, a number of institutions should form consortia to engage in applied research on the uses of technology, especially for improving workplace competencies. And second, telecommunications consortia should cooperate in developing programs for underserved and unserved audiences in both urban and rural areas.

It was clear throughout the conference that we have a long way yet to go to overcome the obstacles to the intelligent use of technologies as laid out in the Lewis-Wall paper. But it was also clear that with the proper leadership within higher education institutions, we could bring the benefits of technology to millions of people throughout the nation and the world.

PART II

Discussion Paper:

EXPLORING OBSTACLES TO USES OF TECHNOLOGY IN HIGHER EDUCATION

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Colleges and universities today are faced with the challenge of keeping pace with a technological revolution of mammoth proportions. Increasingly, the young people who enter higher education as undergraduates come from homes and schools where technologies of various kinds constitute a dominating force. At the same time, colleges and universities are sending recent graduates into a world of work – from the office to the plant to the laboratory – that is becoming technology-intensive at an even greater speed.

The quick pace of technological intervention is found also in the administrative and service departments of higher education, where computing for accounting, purchasing, record keeping, and research is an everyday practice.

On the instructional side, the pace of introduction of various technologies has moved considerably more slowly, despite an increasing proliferation in the market place of computing, audio, video, and new interactive technologies, such as videodisc and two-way audio-video systems.

Although college and university instructors have experimented with information technologies for decades, the typical college professor still teaches in the manner of academicians dating back hundreds of years. Those instructors who venture into technology have often been dissatisfied with their experiences. There remains widespread skepticism on campuses stemming from the historical failure of technological interventions such as closed circuit television.

More recently, the relative lack of high-quality instructional software for computers has reenforced this skeptical view. The promise of videodisc and other interactive technologies to revolutionize teaching and learning (a promise as yet unfulfilled) creates an atmosphere of non-performance that provides yet another opportunity for faculty and critics to make excuses for the relative absence of technologies in America's college classrooms.

This paper constitutes a starting point for discussion about the role of technology in teaching and learning in higher education and focuses specifically on obstacles to the successful infusion of information technologies into the classroom. It is written at a time when colleges and universities seem poised for a giant leap forward into a variety of new technologies, a situation brought on by increasing societal pressure and the continued advances in technology.

Nevertheless, some institutions where historical resistance to technology has prevailed have avoided costly mistakes made by the more technology-enthusiastic schools now saddled with outmoded or underutilized technologies. The reverse side of that coin shows that no institution can afford to do *nothing*. The technologies will continue to evolve; there is no point in time where an institution can become involved in technology with any assurance that over time its acquisitions, too, will *not* become outmoded. For reluctant institutions, the answer may be a simple matter of careful planning and starting small – a pilot project here and there to test the waters and gain experience.

Historical Perspectives

Fully integrating information technologies into higher education is a very difficult challenge (some educators would describe it as nearly impossible). Technology advocates and skeptics alike can point to almost forty years of obvious discrepancies between promises and practices. The pace of technological activity in the last decade on college campuses has increased, and the promises remain very much alive. Still, the anticipated match between technology and learning remains highly elusive.

Perhaps those who are impatient with the pace of change in higher education need to remind themselves that it took educators hundreds of years to learn how to make effective use of the printed word, and some maintain that improvement is still needed in the use of ink and paper, even though the textbook by now can be considered a *mature technology*. However, the demands on education today suggest that it will not have the luxury of additional hundreds of years to learn how to integrate computer, video, and audio technologies into academic instruction. Nevertheless, the challenges remain complex and the roadblocks significant. In the world of technological innovation, education has a long way to go.

Reasons for Using Technology

An examination of obstacles to the use of technology in academic instruction should start with a consideration of the reasons for turning to information technologies in the first place. When college faculty members are asked what role information technologies should play in instruction, there is nearly universal agreement that these innovations should be seen as *supplements* to traditional instruction, not replacements or duplicates of what the teacher in the classroom can do.

Faculty members often cite one or more of the following reasons for using technologies in their teaching:

- To accomplish tasks that they cannot do by themselves, such as helping students experience times, places, people, and events that cannot be otherwise incorporated into the class.
- To accomplish tasks better than they can by themselves, such as helping students visualize phenomena that are too small or too dynamic to convey effectively with print or static models.
- To perform routine teaching tasks which instructors can do but prefer not to, such as helping students overcome individual learning differences through drill and practice.
- To prepare students for the world of work, such as helping students use and apply spreadsheet, word processing, or computer-aided design technologies.
- To enhance faculty and/or student productivity, reducing time required for routine record keeping or communication, such as writing or revising or specific teaching or learning styles.
- To reach, via distance learning, those students who choose not to or are unable to attend classes on campus in the conventional manner.

Reasons for Not Using Technology

Technology is, of course, not always the solution. In fact, if used inappropriately it may become a roadblock to effective learning. Listed below are some of the reasons often cited for not using information technologies for instruction:

- When the technology is inappropriate to the educational task, such as the use of low-production value, pre-recorded video to convey basic course content to under-motivated students.

- When the technology cannot be effectively employed, such as when a classroom has not been adequately wired for audio or video transmission.
- When the technology cannot be afforded, such as insufficient access to computers to justify making major class assignments involving computer applications to all students.
- When a combination of faculty skills and existing print materials are able to convey course content effectively to all students in a specific course.

Because of the widely different needs of time- and place-dependent learning and learning where time and place are variable, the discussion of obstacles has been divided into two sections: *On-Campus Learning* and *Distance Learning*. Within each section, obstacles are examined according to three categories: *technical, structural*, and *attitudinal*. In many ways, these obstacles overlap; to an increasing extent, the difficulties faced in on-campus and distance-learning situations are becoming similar. At the same time, the students served through each delivery means are becoming similar, as the many on-campus students also enroll in distance-taught courses and vice versa.

On-Campus Learning

Technical Obstacles

One of the most formidable challenges to the integration of information technologies into higher education is the rapid pace of technological change and, increasingly, the complexity associated with combining technologies. If money were no object, it would still be difficult to make intelligent decisions about the acquisition and use of computers and telecommunications technologies. When budgets are tight, as is the case at most colleges and universities, costly mistakes can be disastrous, with effects felt for years into the future.

With this constraint in mind, here are the major technical obstacles facing colleges in on-campus use of information technologies:

Lack of Industry-wide Standards. Incompatibility constitutes perhaps the greatest technical obstacle, as colleges and universities struggle to interpret a wide variety of hardware and software designs. This problem is exacerbated by the multitude of potential administrative, research, and instructional applications possible on a single campus or within a multi-campus system. It is further complicated by the proliferation of different types of technology, such as the wide variety of personal computers, found on campuses where purchasing decisions are decentralized and campus standards for support services have yet to be set.

Hardware and Software Complexity. The complex and unfriendly nature of both hardware and software has also been a major hindrance to instructional uses. This situation now appears to be improving, but narrow interpretations, vendor self-interest, and the pace of technological change are working against early resolution of these barriers.

Lack of Instructional Software. The paucity of high-quality software and instructional materials remains a serious deterrent to adoption of technological innovations despite the rapidly increasing proliferation of materials on the market. Unfortunately, much of the current material still suffers from poor instructional design and/or weak content.

Instructional Requirements. Difficulty in adapting to specific teaching requirements is another roadblock to faculty adoption of technology. Issues of format, copyright, accessibility, and price loom large in the faculty assessment of what constitutes acceptable academic software.

Structural Obstacles

The policies and procedures of colleges and universities themselves are often major obstacles to instructional uses of technologies. Some are guilty of sins of both omission and commission.

Budgeting Policies. Institutional budgeting policies and practices often frustrate efforts to make the substantial up-front investments required to buy or lease expensive hardware. Departmental budgets are often inadequate to support acquisition and upkeep of computers needed for instructional purposes.

More fundamental questions, however, face those who control the budget. Are the traditional budgeting policies based on enrollment levels adequate if technology pervades all parts of the institution? How should the technology resources be managed, and what kind of support system for the uses of technology will be required and administered?

Lack of Incentives. Lack of faculty incentives and rewards for improvement in teaching is a pervasive obstacle to technology use. The tasks of learning to use computer, video, or audio technologies require considerable time. Without such incentives as released time, scheduling adjustments, or mini-grants, most faculty members find it more rewarding to focus their attention on research and writing in the traditional sense.

Lack of Training or Technical Support. By far the greatest problem facing institutions desiring widespread use of technology is training people at various levels to be able to use the technological resources. Instructors, administrators, staff, and students need to be trained to use the systems and equipment. In addition, adequate technical support and service systems for equipment maintenance and repair need to be provided.

Poor Support Services. Without adequate support services and meaningful training programs, even a highly motivated faculty member finds using technology a frustrating experience. Critical support services fall into the following categories:

- Information about hardware and software
- Evaluation of hardware and software
- Demonstrations of hardware and software
- Training and technical assistance for faculty and student users
- Maintenance and repair of equipment
- Communication with current and potential vendors
- Acquisition and cataloging of software and programming materials

- Establishment and documentation of institutional standards and procedures for software and hardware use
- Distribution of equipment and supplies (initially and on a continuing basis)

The experiences of more technology-intensive institutions indicate that variations of all these support services are needed to integrate technology into instruction effectively. The failure to provide academic users with these services, even on a modest scale, can undermine an institution's efforts to encourage greater use of technology.

Software Development. An even higher level of support is needed on those campuses where faculty members are expected to develop as well as to use technologies. The challenge of adapting or developing software is considerable, and faculty members need the help of skilled programmers and instructional designers to play this role successfully. Without such assistance, only a small minority of motivated and technically skilled teachers will produce useful instructional resources.

Financial Resources. Many colleges and universities lack the financial resources necessary to provide adequate hardware, software, or support services. Smaller and less affluent colleges and universities have a difficult time competing with larger, wealthier, and more prestigious institutions. In addition, vendor generosity often rewards the latter group disproportionately.

Access. It is difficult to have much impact on the teaching and learning process if a college cannot provide its students and faculty members with convenient access to the technology. For example, until there are sufficient numbers of computers available, faculty members will be reluctant to make class assignments that require access to computers. Colleges that are unable to provide a sufficiently computer-intensive environment may find themselves relegated to a second-class status compared to wealthier institutions. The consequences of such inequities may have a negative effect on recruitment of faculty members and students in turn.

Logistical Annoyances. Some of the obstacles can be traced to what appear to be relatively minor annoyances which, left unresolved, can build into major barriers. Among them are logistics, turf battles and even security systems.

Most college teachers have at least one war story to relate about pushing an audiovisual cart between buildings during a snowstorm or about arranging for a video or computer demonstration that fails to work properly. A faculty member who discovers that the wrong equipment has been delivered or who cannot make the software work is not likely to forget the embarrassment or the awkwardness of the situation for some time.

A student or teacher may find a computer lab inaccessible or unavailable due to security practices that close campus buildings at certain times of the day or week, or that limit access to users with certain prescribed clearances. The rationale for the security measure may be understandable, the purposes laudable, but the result may be increased frustration for students and faculty members who are locked out.

Disproportionate Access. Disagreement over who controls placement of hardware, scheduling of facilities, or selection of software may also lead to problems that students and faculty members find they can do little to resolve. When a computer lab belonging to the math department sits underutilized while English or economics students cool their heels in long lines, struggles over who has what authority are a near certainty. Moreover, much of what is written about computers (including the manuals) can more easily be read by scientists and engineers. As the social scientists and humanists expand their uses of the technologies, the disproportionate access issue will grow.

Extra Time Required. Most faculty members report that using technology generally takes more of their time than teaching by conventional methods. This is particularly true for instructors who develop their own software or programming materials. Faculty members who are developing software almost universally report that they are devoting substantial blocks of time for which they receive no additional compensation.

Underutilization. Many campuses have installed networks of varying kinds including voice, video, and data interconnection. Often their uses are restricted to small divisions of the institution. Sometimes, too, ignorance of the existence of the technology resources on campus inhibits more widespread development and usage.

Attitudinal Obstacles

The attitudes that hinder technology use should be familiar because most people share them to some degree. Apprehension about change, fear of technically complex devices, concerns about job security, resistance to being in the learning mode, worry that students are too uncomfortable with new devices, skepticism about claims made in the name of technology, and previous negative experiences are among the many attitudes that slow the pace of technological advancement in academia.

Fortunately, even academicians change their views over time. No less fortunately, some aspects of the technology also become friendlier over time, as users become more familiar with them and as hardware and software designers make new advances to create user-friendly machines and programs.

Mechanistic Focus. In any organization faced with decisions about the introduction of new technology, it is easy to focus almost exclusively on the hardware components. While the hardware may be expensive and even flashy, the users ultimately determine how effectively the equipment is used.

An institutional bias toward mechanistic innovation, without a companion commitment to teach users how to use the equipment and to supply related support services, is an attitude that can create roadblocks to effective use of the investment made in equipment, machinery, and space. Further, a lack of any organized, systematic, and integrated approach can turn over decision making to people who do not enjoy a comprehensive, organizational perspective.

Faculty Resistance. How campus administrators spend technology budgets is not the only attitudinal impediment to effective adaptation to information technologies. Faculty members themselves are often the creators of significant obstacles through their own intransigence, ignorance, or bias related to technology and its uses. In addition, many faculty members have had quite real, highly frustrating experiences that enable them to point to past disappointments as good reasons for current resistance.

There are many reasons why faculty members resist such changes. Specifically, using technology for instructional purposes has the following effects:

- Interferes with student-faculty communications by getting in the way and taking up too much class time
- Requires too much prior planning
- Involves working in collaboration with technicians and instructional designers rather than working alone
- Requires too much time to learn to be proficient
- Disrupts the traditional faculty authority role by forcing faculty to deal with matters outside their particular expertise
- Removes from faculty members their control of their intellectual property as their courses are transferred to video or some other technology
- Threatens faculty jobs as administrators try to substitute technology for conventional teaching modes

Distance Learning

The concept of learning that occurs between instructors and students separated by distance is probably as old as the practice of letter writing. Correspondence instruction is a more formalized version of this learning process. As new technologies have emerged, radio, phonograph records, television, video and audiotapes, computers, and other developing technologies have been integrated with print materials to facilitate teaching and learning across distances.

Historically, distance learning has been at the periphery of American education. In recent decades, it has been gradually winning acceptance as a tool for filling in the gaps in our otherwise comprehensive educational system. The proliferation of information technologies has made it easier to use distance learning techniques to meet the needs of time- and place-bound adults, as well as youth in smaller and rural high schools that lack sufficient capacity or training.

As information technologies make time and place less relevant variables in the educational process, the lines between traditional campus-based learning and distance learning are likely to blur. As more local, state, and national governments strive to meet their dual commitments to access and to quality, they are likely to take a growing interest in encouraging distance learning. Overcoming obstacles to distance learning will be an important part of this movement.

Technical Obstacles

Distance learning has two inherent problems: *providing the student with sufficient educational resources and providing timely feedback from the teacher to the student.* Information technologies can help overcome both of these problems. Unfortunately, there are some factors that hinder effective use of these technologies for this purpose.

Pace of Change. The rapid pace of technological change acts as a double-edged sword for those organizations and institutions that want to implement distance learning systems. It is difficult to design a local, regional, statewide, or multi-state delivery system that takes advantage of current technological capabilities and yet is not in danger of becoming obsolete in the near future. Knowing that this problem "goes with the territory" does not end the frustration.

Inequitable Access to Telephone Service. Although satellite-delivered video and audio lessons, computer mail, and conventional postal services can be used to reach virtually anyone in the United States, rural learners may not have equitable access. Why? Because the capacity of the new technologies to help solve the problems of isolated learners is hindered by inadequate and often prohibitively expensive telephone service or satellite downlinks.

At the same time that urban areas enjoy unprecedented telecommunications options, some rural communities simply cannot dependably use electronic mail or computer conferencing because they are on party lines or have low-quality telephone services. Even when service is adequate, electronic access to libraries and data bases and calls between students and teachers in rural areas may be impractical due to the high cost. Furthermore, the distribution pattern of the new technologies is generally market driven, which means large urban populations receive priority over more sparsely populated rural areas.

Access to Computing. Lack of access to computers can be a more serious obstacle in distance education than on campus unless the student can handily use equipment at a local school, library, or workplace, or has computer equipment at home. Lack of quality software affects distance education, as well as on-campus programs. Away from the campus, it is more difficult for the student to get help in learning how to use software or in figuring out the bugs in hardware configurations. Like their colleagues on campuses, off-campus students may have difficulty with incompatibility of systems or lack of standards for data transmission and electronic communications.

Inadequate Software Design. Many technology-based programs were designed with the on-campus student in mind, so they may contain only partial lessons or lesson elements designed to be supplemented in the classroom or laboratory. Further, simulated laboratory programs are scarce, making the distance learner's inability to get to a laboratory a definite handicap in learning in those courses that assume that a laboratory experience will be available.

Support Service Complications. Students at a distance need most of the support services of on-campus students and then some. The fact that they are distant from the campus center makes providing these services even more difficult, further complicating the many handicaps that off-campus students often face.

Basic training programs delivered by telephone and mail to get distance learning students started can ultimately result in additional training by electronic mail or computer conferencing.

Structural Obstacles

A number of the structural obstacles encountered by distance educators stem from the fact that their activities and programs often challenge rules and regulations devised for campus-based instruction. State funding policies that are based on hours of face-to-face contact are an obvious example.

Need for Collaboration. Because technology does not respect the traditional boundaries of schools, colleges, states, or regions, distance learning often involves collaboration among many organizations. For example, establishing a statewide distance learning network may entail collaboration among educators from different institutions and sectors, as well as representatives from business, government, and the communications industry.

For many in the education community, moving beyond traditional turf to address regional or statewide needs of distance learners can be difficult. Failure to adjust to these new circumstance can hinder effectiveness, rendering relatively worthless the technological advances that make modern-day distance learning possible. At the state level, there is an absence of integrated approaches to telecommunications and computing within state governments, making it difficult to put together collaborative systems that can stretch tight budgets and envelop higher education in a comprehensive statewide service.

Transmission Across State Boundaries. Lack of policies dealing with sharing of programming across state boundaries may hinder the delivery of effective services to students or may cause complications in out-of-state tuition and similar practices which are often the subject of protracted negotiations where they apply to on-campus programs.

Access to Libraries. Off-campus students typically do not have equitable access to library systems, even though libraries increasingly offer totally automated services to students on site.

Lack of Accessing Skills. Many off-campus students can access an increasing variety of commercial data bases, but they often lack the skills necessary to use them effectively. Further, no support or training is available to help these students learn how to use such systems.

Attitudinal Obstacles

For most distance learning situations, the same attitudinal barriers exist that are found on campus. These additional hurdles are also relevant.

Faculty Resistance to Public Exposure. To the extent that a faculty member's lecture suddenly becomes public, such as through TV broadcast, faculty members may resist the notion that they are suddenly being watched by non-students and casual viewers.

Faculty Resistance to Off-Campus Learning. Some instructors are simply resistant to dealing with the student who cannot get to the campus and have little or no sympathy for the student whose life situation does not permit attending college in the traditional manner. Among these are teachers who believe they cannot teach if they "cannot see the students' faces," or who are reluctant to try interactive transmission systems that enable instructors to see students in classrooms located a distance from the campus. Some believe that "you can't teach this way," no matter what.

Poor Marketing Orientation. Some educational institutions view technology as a vehicle to enhance marketing capability, principally to concentrated markets of professionals, even though the same or similar technology also could be used to reach target markets excluded from higher education for financial or geographical reasons. It is also ironic that some colleges and universities have found technology a useful vehicle to reach urban-centered professionals but not more isolated rural populations whose access to the campus is considerably more than a scheduling problem.

In spite of these and other obstacles to technology use, there are signs of genuine progress in the development of varying uses of technology in colleges and universities. A number of professors are exploring the use of a variety of technologies, and some faculty members are developing their own software. Academic support staff are rendering invaluable service to both faculty and students. Some institutions are planning and implementing programs utilizing technologies that are institution wide.

Yet despite these advances, the obstacles noted here continue to inhibit the broad use of technologies in colleges and universities. The obstacles are complex and interrelated. It is time to move from bewailing the obstacles to planning new practices, policies, and strategies that will encourage pilot developments, expand existing usages, and cooperate with the private sector, a partnership that should embrace not only the profit motive but also the goals of education. The strategies to overcome these obstacles warrant our serious attention.

PART III

Case Study:
MARICOPA COUNTY COMMUNITY COLLEGE DISTRICT

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The Maricopa County Community College District in Arizona is composed of seven colleges and two educational centers, enrolling 120,000 students per semester (90,000 for credit and 30,000 for non-credit). This case study demonstrates how an institution committed to the use of technology has addressed the five major themes of the Round Table on Technology in Higher Education: access, quality teaching and learning environments, training and support systems, collaboration, and finance.

The Maricopa County Community College District was not always as oriented to the use of technology as it is now. In less than a decade, the District had moved from 150 terminals and personal computers to 7,000. The District has used technology as a metaphor for change, and faculty and staff have responded to the implications of technological changes in all aspects of the academic endeavor. A series of formal and informal planning meetings resulted in specific plans and budgets, and the District developed a successful $150 million capital development plan, with $31 million allocated for technology.

The entire academic community, faculty and staff, has come together to plan new projects and to modify old ones. In this process, the by-products of using technology – improved communications, a sense of sharing, and visions of a different future – have become as important as the programs themselves.

Access and Equity

The District's concern for access and equity was summarized by faculty member, David Dalby:

> *Providing access means removing any obstacles that impede or prevent the successful attainment of goals by students or faculty. It means identifying, recruiting, and serving new types of student populations; improving the kind, degree, and effectiveness of the delivery of education programs. It can involve technology, procedures, social issues, legal statutes, economic factors, instruction, administrative processes, structural facilities, or equipment.*

To provide equal access to all citizens, the District has undertaken a variety of initiatives.

Maricopa County Coalition for Literacy

There are 400,000 illiterate adults in the state of Arizona, and only about seven percent can be served with existing resources. Included in the definition of literacy is computer literacy, because society increasingly demands more than basic reading and writing skills. The Coalition, which includes academic institutions, government agencies, community-based organizations, and private employers, is designed to help develop networks and secure funding for literacy efforts. For example, programs such as the PALS (Principles of Alphabetic Learning) labs use computer-assisted instruction and videodisc technology to supplement one-on-one tutoring, thereby allowing more intense and flexible instruction and making services available to more users.

Distance Education

In 1978, Rio Salado Community College was established as a non-campus college within the Maricopa County Community College District, charged with managing alternative delivery systems for distance education. This college-without-walls uses a variety of delivery systems to serve 1,600 students each semester: broadcast and cable television, audio and video cassettes, audio and computer conferencing, and slow-scan video, as well as traditional correspondence study.

Rio Salado's newest delivery system is computer conferencing. Students can access instruction, submit assignments, and communicate with faculty and fellow students entirely through computer conferencing. Students and faculty may access the system through dial-up modems, using personal computers in their homes or offices, or through microcomputers or terminals located anywhere in the District if connected to the district-wide data communications network.

SunDial Network

The SunDial Network, Rio Salado Community College's audio teleconferencing system, enables students at remote sites as well as homebound students to take courses. The Network is also used extensively for administrative and instructional meetings by faculty and staff throughout the District as well as by other educational and non-profit groups throughout the state.

Sun Sounds

Sun Sounds is a free, statewide radio reading service for the blind and the physically handicapped. Transmitting from Phoenix and Tucson over closed broadcast signals, the service operates 24 hours a day, seven days a week. News from major newspapers, advertisements, stories, travel information, and radio theater are provided to 11,000 persons by 385 volunteers. Sun Sounds is part of a national radio reading service, and Maricopa produces about 20 programs weekly which are distributed nationwide.

KJZZ-FM Radio

KJZZ-FM operates 24 hours a day, seven days a week. Its signal extends to major population areas throughout the state. Affiliated with both National Public Radio and American Public Radio, KJZZ-FM originates a substantial portion of its programming aimed at the 25-49 age group, the largest age group using the facilities of the Maricopa Community Colleges.

Quality Teaching and Learning Environments

The use of the computer in helping create a favorable teaching and learning environment at the Maricopa County Community Colleges has rested primarily on a strategy of decentralization. More than 7,000 terminals and computers are available to support students, faculty, and staff. Most faculty have work stations in their offices. Departmental and large-scale open laboratories are also available for students to use during both day and evening.

A second strategy involves computer networking to enhance compatibility, increase efficiency, and improve computer support. Through networking, messages are easily transmitted among students, faculty, and staff. The proliferation of computers and their widespread use has helped raise the computer literacy skills of all students and faculty. In addition, the Colleges are connected through a wide area digital microwave network with 3,000 active ports for data transmission. This network also supports an inter-college voice communications system.

Student Tracking Systems

A computer software system for student tracking, MAPS (Monitoring Academic Progress Systems), is of great assistance to students in the advisory process. MAPS shows students what courses they need to complete their programs, provides curriculum management information, and handles the degree audit. The software is available at all the Colleges in the District, so that a student's transcript can be electronically retrieved and reviewed at any campus. In addition, programs at nearby Arizona State University are on the MAPS system, thereby allowing students to see how their courses fit within the university's requirements.

Faculty Computer Literacy Project

The key to computerized instruction has been the involvement of the faculty, and by now 80 percent of the full-time faculty are computer literate. The essential element in the training of faculty was permitting them to take computers home for three months. While they experimented with the computers during that time, faculty members were required to attend one afternoon workshop each week. A new group of faculty was cycled through this program every three months, and everyone who wanted to participate was accommodated. Now many faculty members develop their own courseware and do their own programming.

One substantial change has been the faculty's attitude toward pre-packaged software. Originally suspicious because of the "not-invented-here" syndrome, faculty now worry more about the functionality of the package and are more willing to accept software from the outside.

Library Automation

The Maricopa Community Colleges now have automated systems for circulation, acquisitions, and cataloging; all materials in the districtwide library collection are barcoded. The automated library system is also fully integrated with the instructional and administrative software systems. Information access has become the watchword for all students, faculty, and staff, as well as citizens living within Maricopa County.

The library automation system provides faculty and students with on-line public access to holdings at all libraries within the District. Students and faculty are also linked by computer to nearby Arizona State University's library system. The year before automation, inter-library loans totalled 1,100. Now, with automation, a book can be delivered the next day from anywhere in the system. Inter-library loans on a busy *day* almost reach the total number of loans for a *year* prior to automation.

Writer's Network

Improving the quality of student writing has been a major objective of the Colleges and has resulted in the Writer's Network, which is used to grade the essays of students in English composition courses. Students prepare their essays in electronic form, either from their homes on personal computers or terminals or from a computer laboratory on campus. Students may use any word processing package with any spelling or syntax checking software. The instructor, who reads the essay on line, may superimpose codes and comments that are selected from a pre-defined list the instructor has prepared. The codes and comments may contain prescriptions and references for the student to use in the future. In addition to the essay preparation and grading functions, the system also feeds the grades assigned to the essays into an electronic grade book. The graded essay is returned to the student electronically.

High Tech Center

One of the Maricopa District colleges, Glendale Community College, has created a High Tech Center. In an area roughly two-thirds the size of a football field, the Center contains 28 Y-shaped islands with 12 work stations designed to give students access to 336 microcomputers and terminals. The design permits self-paced, open-entry and open-exit learning.

Each semester, faculty-supervised instruction in 30 different subject areas reaches 9,000 Glendale Community College students, approximately half the student body. With extended hours on weekdays and weekends, the Center serves 1,000 students daily and allows students to work on assignments whenever they want and for as long a time as they need.

Ocotillo

Its name derived from a succulent plant that has multiple stems growing from one root, Ocotillo is the District planning group responsible for examining technology as a means of maintaining quality in the teaching-learning environment.

A group of faculty and staff drawn from all nine colleges began with certain questions about technology and telecommunications:

- What is the instructional agenda for technology?
- Who is in charge of the agenda?
- To date, what are the instructional and organizational benefits of commitments to technologies?
- Are we in control of the teaching/learning process, or are we driven/limited by available technology?
- How do we plan for future developments in technology?

A number of action/research groups have been formed to address the following issues as they relate to the uses of technology: collaborating across colleges; improving access; integrating learning theory, content, and technology; designing information facilities and classrooms; tapping alternate funding sources, and providing staff development. Each action/research group is led by a faculty chairperson and supported by an administrative coordinator. These planning efforts form the foundation for strategic planning for the continued use of technology. Active participation of faculty and staff working together provides the framework for successfully assessing current uses of technology and planning for future uses.

Training and Support Systems

Training has become the hallmark of technology progress in the Maricopa Community Colleges. Board members, presidents, faculty, and staff have "gone back to school" to develop a wide range of skills. The breadth of training programs has evolved gradually. At first, consulting and systems support were provided for faculty involved in computing and data processing courses. Then came the Faculty Computer Literacy Project for all faculty along with a shift to workshops and seminars covering special computer literacy topics. A more advanced stage developed with the advent of desktop publishing, and soon training emphasized spreadsheets and data bases. Currently, training programs concentrate on teaching how to access information from various sources, including the student information systems, the library/resource systems, and external data bases.

The District adheres to two fundamental concepts in its training programs.

First, training is provided at all levels; it is as important to train clerical staff as it is to train faculty members or college presidents in the uses of technology. Second, the goal is to make all users of technology more sophisticated about technology options. This emphasis on the continuous learning process has given all employees a sense of ownership of the technology.

Dissemination of Technology Information

Technological change comes about in the District only with the involvement of all concerned members of the academic community. For change to occur, members must understand the change and how it will affect their lives, and they must be able to adopt the change within their own work environments, and adapt their activities to accommodate the new approach.

For example in the Telecommunications Improvement Project, a team of faculty and staff set out to teach faculty, staff, and administrators how telecommunications, particularly voice communications, could be used as a tool to help them on their jobs. The team conducted one-on-one and small group discussions at each College, and information was disseminated to all employees in both print and electronic formats. Audio teleconferencing sessions were held as open hearings to give anyone at any College the opportunity to contribute to the planning and design effort.

This dissemination effort was so successful that the model has been adopted for introducing any new technologies or changes within the technology areas at Maricopa. Similar activities are currently under way regarding the use of video communications for on-campus and inter-campus instruction and administrative purposes.

Center for Learning and Instruction

Comprised of two instructional designers and an instructional technologist, the Center provides consultation services regarding the use of several hardware systems. Center staff also evaluate software and assist in the design of courseware. Making frequent and regular visits to all Colleges, the staff provide the technical and design support that many faculty members want and need to use the new technologies effectively.

Support Systems for Students and Faculty

Student support services are the central focus of educational telecommunications at the non-campus Rio Salado Community College. A student handbook is developed each semester and mailed directly to every student enrolled in a course using an alternative delivery system. Discussion and review sessions are held in person or through audio teleconferencing or computer conferencing. Faculty are required to keep regular office hours each week and to communicate with students through newsletters and postcards, developed by faculty in conjunction with staff. A 24-hour student hotline is available for students who cannot reach an instructor during regular office hours. A computer-managed instructional system has been established to grade and record student examinations, to print out individualized letters to students telling them their examination scores, and to analyze test questions for future revision.

Collaboration and Cooperation

Within a nine-college system such as Maricopa, collaboration and cooperation are essential elements for success. A process approach to management that involves many people from each of the Colleges is fundamental. Equally important are collaborative arrangements with the business and industry communities and other academic institutions throughout Arizona and across the United States.

User groups on each campus meet regularly to provide advice to management on the technology agenda, report back to the Colleges on the directions taken, and help determine priorities. Currently there are active user groups for student information systems, student tracking systems, human resource systems, accounting systems, financial aid systems, academic systems, telecommunications, library, automation, and computer operations.

The "factor of nine" complicates the management of information technologies, because each College has its own president, dean, registrar, financial aid officer, fiscal agent, etc. Consequently the District has taken several steps to unify operations.

Information Technologies Executive Council

The Information Technologies Executive Council (ITEC) manages the information technology function for the entire District. Composed of four vice-chancellors, one college president, one faculty member, one member of the District Governing Board, and a vice-president from Arizona State University, ITEC approves all hardware and software purchases, sets priorities, communicates policies, and determines new initiatives.

The Council meets monthly as a board with a formal agenda, and official voting records are kept. The Council reports directly to the Chancellor of the District. ITEC provides a vehicle for balancing college and district office interests with academic and administrative interests. It requires planning input from the seven colleges and two centers, as well as from its own staff. ITEC provides a broad base of support and wields substantial political clout on behalf of the information technology agenda.

Think Tank

The recently formed Think Tank is comprised of representatives from the Maricopa Community Colleges, the Phoenix Union High School District, and eight elementary school districts that feed into the high school district. It provides a forum for discussion of issues and a means of implementing joint projects without regard to territoriality or previous practices. Its main concern is the "at-risk" student. Although solutions are ultimately grounded in effective teaching, an improved curriculum, and attention to the social and economic circumstances that affect a student's ability to learn, technology can help institutions share programs and monitor student progress.

Designed to develop and implement pilot projects, modify structures, remove obstacles, and suggest innovative solutions to problems, the Think Tank is conducting a number of projects involving the use of technology: an electronic mail link between Maricopa and the Phoenix High School District, library access and on-line college registration for high school students, and a student monitoring and assessment system.

Arizona Educational Telecommunications Cooperative

For a number of years, the Maricopa Community Colleges have worked together with other Arizona community colleges and the three Arizona universities to share technologies and/or technology-based courses on a cost-sharing basis. That cooperation has resulted in the creation of the Arizona Educational Telecommunications Cooperative, comprised of all of Arizona's community colleges and the three universities – the University of Arizona, Arizona State University, and Northern Arizona University. The goal of the cooperative is to establish educational initiatives that can be addressed by a statewide telecommunications network. The state legislature has been asked to fund a statewide needs assessment, which could lead to construction of a statewide network in the early 1990s.

Business/Training Partnerships

The Corporate Services Division was created at the District level to contract with private industry to provide quality training programs. The Division has major training contracts with many of the leading industries in the Phoenix area. The Colleges train more than 5,000 Motorola employees, and General Motors supports a training institute for several western states at one of the Maricopa Colleges. Technology also supports sophisticated training programs for Honeywell, McDonald-Douglas, B.F. Goodrich, and other major businesses in the state and nation.

Partnerships with Technology Providers

A three-way partnership of Digital Equipment Corporation (DEC), Information Associates (IA), and the District has brought millions of dollars in savings for hardware procurement and resources for developing new software packages. A team of programmers from Information Associates is housed at Maricopa full-time, and DEC and IA provide corporate assistance for software developments used in projects described above.

Another partnership with NEC America, Inc. and NEC Home Electronics (USA) enables Maricopa to demonstrate digital video technology using NEC's video codecs across Maricopa's digital microwave network. Several video applications are being developed for this new technology.

Consortia and Professional Organizations

Maricopa is represented on the eleven-person executive committee of the prestigious Business-Higher Education Forum, comprised of 40 of the largest Fortune 500 companies and 40 of the largest colleges and universities. The Forum's objective is to influence Congressional and White House policy on the nation's technology and science agendas.

The Colleges long have been involved in regional and national technology-oriented groups such as the League for Innovation in the Community Colleges, the College and University Systems Exchange (CAUSE), the Instructional Computing Educational Consortium, the National University Teleconferencing Network (NUTN), the Instructional Telecommunications Consortium (ITC) of the American Association of Community and Junior Colleges (AACJC), and the Public Service Satellite Consortium (PSSC).

International Collaboration

During the spring 1989 semester, Rio Salado Community College, the non-campus college of the District, along with Austin Community College in Austin, Texas, offered a marketing course with Adelaide College of Technical and Further Education in Adelaide, Australia, using audio teleconferencing. Six international linkup sessions featured marketing experts as guest speakers.

Finance

Central to all technological developments at the Maricopa Community Colleges has been the question of how technology would be financed. The desire for new technology continues to grow, and up-front costs are high. In the early years, a policy loosely described as "under-management of the technology agenda" prevailed. That meant that technological advances would, for the most part, come out of annual budgets, and it was up to each College to decide how it would finance technology.

Glendale Community College offers an example of how this policy was successfully implemented. Faculty and administrators began discussion about the importance of the appropriate uses of technology. Debate was heated and there were great disagreements. By the time resources were reallocated to support faculty and students in the use of technology, general consensus had been achieved. Glendale confirmed one of the most important principles for introducing technology and mobilizing support: Have decisions about the technology made at the level where technology will be used.

No matter how much money is squeezed from ongoing budgets for technological advances, eventually large outlays of up-front money will be required. At Maricopa this came in the form of a $150 million capital development plan, of which $31 million over ten years was designated for acquisition of a telecommunications system, expansion of computing hardware and software, and construction of a microwave network to connect all college locations for voice, data, and video communications.

The Information Technologies Executive Council (ITEC) allocates approximately $3 million yearly: $1 million to the seven colleges and two educational centers, $1 million to support the computing network, and $1 million for special projects. College allocations are awarded on a base dollar amount plus a per student amount to each College. Careful plans and documentation must be submitted by each College.

Passed in September 1984, a $75 million bond issue marked a significant achievement in gaining public support for information technologies. The District has also dedicated a large amount of its regular budget to making technology an integral part of instruction and administration at the Colleges. Since 1984, $15 million has been spent in direct support of both academic and administrative computing, and the number of work stations has grown by 6,000. Overall, Maricopa has spent about $33 per headcount student, or $75 per full-time equivalent student, for information technologies.

PART IV

Case Study:
ROCHESTER INSTITUTE OF TECHNOLOGY

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This case study demonstrates how a four-year college has incorporated technology into almost every phase of its operations and illustrates the themes of the Round Table. The Rochester Institute of Technology (RIT) is composed of nine colleges and enrolls 13,000 students; it offers more than 200 academic programs. Of the 11,600 undergraduate students, approximately 3,000 are enrolled part-time.

In 1985 Thomas Plough, Provost and Vice-President for Academic Affairs, proposed that

> *Rochester Institute of Technology closely identify itself with those powerful technologies – even more powerful in their interactivity – which are literally transforming the way we work, think, and live, a transformation as profound as the agricultural and industrial revolutions – applied communications technologies. These changing technologies provide opportunities to employ electronic and telecommunications instructional delivery systems far more extensively and systematically than we do at present.*

The administration's advocacy has created a climate of support for information technology to grow and prosper at the institution.

Access and Equity

Each year almost 1,500 students participate in courses delivered off campus through distance learning techniques. The needs of the learner and the learning situation determine the choice of delivery method for RIT's distance education programs.

As early as 1970, RIT's College of Engineering responded to special needs by offering advanced courses via videotape at local industrial sites. Since 1980, RIT has used a mixture of technologies to bring learning to students where they live or work. The Telecourse Office initially offered two video-based courses on a suburban cable television system to 56 students; since then more than 4,500 students have enrolled in telecourses offered both on cable and broadcast television. Each year, more than 800 students are enrolled in 30 classes offered on video.

Videotapes are also available on campus, at two industry learning centers, and for use by students on their home VCRs. For example, courses in engineering technology are offered at Jamestown, New York, 120 miles from the campus; instruction makes use of RIT-produced videotapes and real-time conferencing with an interactive, PC-based telewriter and speaker phone.

Video materials are purchased from major producers and modified with RIT-produced introductions, summaries, and supplementary programs. Audiotapes, study guides, and text materials provide clear learning guidelines. Communications take place between faculty and students by telephone, mail, and optional meetings.

Currently a dozen telecourses use audioconferencing as one possible interaction technique. Occasional courses have been offered totally via audioconferencing, and experiments are under way to have entire courses taught this way. Speaker phones have been used to bring outside speakers to campus classes, and audioconferences via bridged telephone calls permit private discussions between students and faculty.

Computer conferencing enables students to create and submit homework; receive feedback rapidly; interact with instructors and other students in the class; and access software, library resources, and advisory information. Currently 20 courses are taught by means of computer conferencing. More than 50 other courses use computer conferencing for open discussions, and several self-tests have been initiated on computer.

As the site of the National Technical Institute for the Deaf, RIT has explored extensively the use of computer-based communications systems. For example, one instructor uses captioned video materials and computer-based communications (with a speech board) to teach a course to both hearing-impaired and hearing students. Hearing-impaired faculty have used computer conferencing as the main system of course delivery for their students. A speech synthesizer is available at the computer center for student use. The library also houses a Kurzweill reader to provide access to print material for the blind and a closed caption decoder attached to a VCR for hearing-impaired viewers.

RIT has implemented touchtone telephone registration with a voice response mechanism. The student calls from a touchtone phone, and the voice response unit asks for the student's ID number, course requests, etc. Students can register, drop and add courses, and receive immediate feedback on the success of their registration request. A typical registration takes about four minutes. The system has been modified to permit the hearing-impaired to use a keyboard and screen to enter and receive information.

Quality Teaching and Learning Environments

As a comprehensive technological institution, RIT's teaching – both what is taught and how it is taught – is subject to the changing nature of technology. RIT encourages faculty to make use of technology to improve the quality of instruction.

RIT currently has 2,300 devices connected to its central computing system – about 1,900 personal computers and 400 work stations. Over 15,000 academic computer systems accounts exist. Four personal computer labs with a variety of hardware and software are available for open use seven days a week, in addition to college-dedicated labs for students in specific programs. A fiber optic cable provides the backbone for a campus-wide network, with all buildings wired for voice, video, and data communication. Plans call for the activation of computer ports in all residence halls in 1990.

Classrooms and lecture halls are equipped for telephone and computer access and cabled for closed circuit video. Overhead projectors and screens are available for use. Media equipment (including audioconferencing equipment, projection video, and computer display units) with operators are provided on request. These services extend to off-campus programs as well, which currently account for about five percent of requests.

An extensive, broadcast-quality production facility includes a television studio, which is used by communication, psychology, and business classes to record student presentations. A 20-station language laboratory supports foreign language instruction and English as a Second Language courses.

RIT's library catalog is accessible through the on-campus computer network or by modem and telephone lines for off-campus learners. RIT also has access to numerous other library systems and data bases, computer conferencing systems, and more recently computerized research programs in the form of collegial conferencing through the New York State Educational and Research Network.

The Library has recently installed a second-generation computer system and is adding to its collection of CD-Rom materials. The Library currently has eight CD-Rom stations and is planning for the installation of a multiple-user CD-Rom network. Planning is also under way for creation of an Imaging Science Resource Center, which would utilize state-of-the-art communications technology to access imaging science information and data bases throughout the world.

The Registrar is installing an Automated Degree Audit System to match course work with degree requirements and also provide a system for academic monitoring and tracking.

Training and Support Systems

RIT's goal is to train all faculty and students in the use of technology. RIT realized that faculty and students would need more than computer *literacy*; they would need computer *competency*. Competency would have to be discipline specific, and training would have to begin with the faculty if technology were to be integrated successfully into the instructional process.

Training and support systems operate at several levels. First, professional staff from the Academic Services and Computing Division, Distance Learning Projects, and the Library offer support to the faculty. From the professor about to use the on-line catalog for the first time to the faculty member about to teach via video or computer conferencing, RIT's emphasis is on providing support to the extent that the professor is comfortable using the technology.

Instructional Media Services offers help in locating materials and purchases media at the request of faculty. Materials such as graphic screens for the telewriter and videotapes of lectures are produced to support distance learning instruction.

For faculty and staff who need more extensive help, Instructional Media Services offers six or more workshops each year to introduce new audiovisual technology such as liquid crystal display units, audioconferencing speaker phones, and desktop publishing software. A more sophisticated level of training and support comes in the form of pilot projects to assist professors in testing alternative delivery systems such as videotapes to reduce repetition of demonstrations or scripted, full-tv productions.

In 1981, RIT held its first workshop for faculty on microcomputers. For the next five years, two-week summer workshops were offered for faculty and staff. The focus and content of the workshops evolved as software and hardware developed. In recent years, the workshops have aimed at developing new classroom uses for generic software tools such as data bases, spreadsheets, and word processing.

During this same period, computer literacy courses for students were initiated, and RIT now seeks to have all students demonstrate proficiency in computer-based technology as a general tool by the end of the first year and as a professional tool by the time they graduate. Every year more than 500 workshops are offered to students, faculty, and staff. In addition, a wide variety of user guides are distributed.

Collaboration and Cooperation

One of the most significant developments in the advanced uses of technology came with the establishment of the Division of Academic Services and Computing. Comprised of the Library, the Office of the Registrar, Instructional Media Services, Information Systems and Computing, and Distance Learning Projects, the Division is headed by an associate vice-president who reports directly to the provost and vice-president, academic affairs. The Division employs 155 staff members, of whom 87 are professional staff.

Thus, the professional staff responsible for introducing technology systems and keeping them functioning all work together to provide systems support for learning. Increasingly, their responsibilities overlap, and projects depend upon interactive dialogue which is carried on by electronic mail, telephone, and personal contact. Audio, video, and computer technologies operate from a common base, making it easier for professional staff to collaborate on any given project.

Within each unit, faculty opinion and involvement are solicited. There are a number of advisory committees such as the Institute Academic Computing Committee and the Library/Faculty Committee. Instructional Media Services and the Director of Distance Learning Projects bridge departmental and college lines by previewing, purchasing, and preparing media after determining needs for instructional delivery and support systems.

In 1985, RIT downlinked seven nationally distributed training programs through the College of Continuing Education and the following year installed a C and Ku Band receiving dish, which has enabled the institution to bring hundreds of satellite-delivered programs from around the world. Since installing the dish, RIT has received over 400 programs in a wide variety of disciplines.

For ten years RIT and Eastman Kodak have jointly sponsored a series of lectures on the graphic arts and photography; in 1988 they took the series nationwide. Collaboratively four RIT departments and two units within Kodak conducted a teleconference that went to 569 sites with an estimated audience of 15,000.

RIT has a long tradition of applied research. In the last two years, more than $10 million in equipment support has been provided by business and industry. In return, the Centers for Microelectronic and Computer Engineering, Computer-Aided Design, and Imaging Science cooperate on a regular basis with industry and business (as well as with government) to facilitate effective technology transfer between the educational and industrial sectors. RIT is currently working on plans for a Center for Integrated Manufacturing Studies. A key element in this $33 million facility will be the use of distance learning technology for the purpose of technology transfer.

Another instance of corporate collaboration was Apple Computer's support in establishing a program of instruction in writing and the graphic arts with the Colleges of Liberal Arts and Fine and Applied Arts. This led to the establishment of a Macintosh microcomputer lab, which is used by students in writing and art and design.

The KEY program took RIT into another significant area of education. Students in three rural school districts outside of Rochester take courses for credit through a mixture of delivery techniques such as the computer-based telewriter, computer and audioconferencing, and videotapes. Courses have been offered in calculus, economics, U.S. politics, and English composition and literature.

The University of Rochester and RIT have jointly created the Rochester

Consortium for Distance Education to explore technology-based delivery of instruction. Their first project – a four-part video conference, Economics for Educators – originated from the Eastman Kodak Company's KBTV studio and satellite uplink. Driven by a new state-mandated requirement for a twelfth-grade economics course, twenty sites across New York State received the broadcasts and interacted by two-way audio. Featuring economists, curriculum specialists, and social studies teachers, the presentation included an actual economic simulation with the teachers at the downlink sites acting as students.

Finance

The Division of Academic Services and Computing has a yearly operating budget of approximately $10 million, indicating strong support for centralized technology services, even as much of the decision making is left to the faculty and staff. For example, the Instructional Media Services subsidizes up to $30 of the rental or production cost of any one media request. This allows faculty to make slides, audiotapes, or transparencies or to rent current films and video without cost to their departments.

Media is purchased at the request of faculty with few strings attached. If an expensive piece of software can be used by several departments, shared purchase is negotiated. The library often shares in the purchase of requested media, using its material funds. For services provided through the Division, charges are based on incremental costs for materials and student help; in most cases no attempt is made to recover costs for overhead or staff time for academic or instructional projects.

To encourage faculty to continue improving and enhancing instructional offerings, a fund of $100,000 a year has been set aside for projects related to productivity. Five faculty members from different disciplines administer the grant program and recommend distribution of the funds. Distance learning programs are a priority for the grants, and funded projects have included the development of computer conferencing, the use of audioconferencing, the use of the telewriter, and production of complete courses on tape for distance learners.

The Academy for Educational Development (AED) is an independent, nonprofit organization that addresses human development needs through education, communication, and information. In partnership with its clients, AED seeks to increase access to learning, transfer skills and technology, and support institutional development.

Under grants and contracts, AED operates programs for government and international agencies, educational institutions, foundations, and corporations. Since its founding in 1961, AED has conducted projects throughout the United States and in more than 100 countries in the developing world.

For further information about AED publications, contact Frances Hays, publications coordinator.

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Appendix IV--Comments

FIPSE staff should consider the three major shortcomings discovered during the course of this computer conferencing and E-Mail project -- technical support, training and marketing. In addition, it should look for broad leadership within the institution -- including the President, the chief academic officer, the Deans, the faculty and the computer center.

Secondly, FIPSE could be helping those projects that utilize multi-media, including graphics, video (connected to the computer), the videodisc, and other technologies that can be used to improve instruction and increase access.

Thirdly, there should be some experimentation with extensive use of the interactive computer with traditional classes, such as having classes meet only once a week and carrying on the rest of the instruction through E-Mail or some such electronic system.